Partial bypass was instituted, but there was inadequate myocardial contractility, which did not improve in response to a brief infusion of dopamine. At this time the ECG showed marked S-T-segment elevation. The left ventricle was dusky in appearance, and insertion of a 25-gauge needle into the distal left anterior descending coronary artery obtained no flow of blood. Hypothermia was reinstituted immediately with cardiopulmonary bypass. Iced Ringer's lactate solution was placed around the heart since the left ventricle was not cooling properly. The aorta was cross-clamped, and a transverse aortotomy in the ascending aorta led to the discovery of a tumor fragment 1 cm in greatest dimension in the left coronary cusp. After removal of the mass, no back-bleeding from the left coronary artery was seen. A number-2 Fogarty catheter was inserted in the left coronary artery and upon withdrawal, a tumor fragment 0.4 cm in greatest dimension was removed. This was immediately followed by brisk back-bleeding from this vessel.

Soon after this, the ECG pattern changed to that of ischemia with S-T segment depression and inverted T waves. By the end of the operation the ECG pattern had returned to normal. The patient was taken off bypass without difficulty; central venous pressures ranged from 15 to 22 cm H_2O. Examination of the patient after bypass revealed normal carotid and superficial temporal pulses bilaterally. Pupils were equal, slightly constricted, and slowly reactive to light.

Postoperatively, the patient's course was complicated by congestive heart failure and slowly resolving left hemiparesis. The latter was ascribed to intraoperative cerebral emboli. He slowly regained consciousness, was able to converse coherently, and had bladder and bowel control.

The patient was discharged with instructions to take lanoxin, furosemide, and potassium chloride supplement. The latest chest x-ray revealed a marked decrease in heart size; ECG showed sinus rhythm and right ventricular hypertrophy. He was transferred to Veteran's Administration Hospital for continued rehabilitation, but is still unable to ambulate without assistance.

Discussion

Reports of coronary embolization arising from left atrial myxomas are rare. Gleason[1] reported a 13-year-old girl found at autopsy to have a left atrial myxoma with healed infarcts in the left ventricular myocardium. Adjacent small coronary arteries contained tumor fragments. Two of five patients discussed by Harvey[2] were found to have coronary emboli at autopsy. Sybers and Booke[3] reported one case in which there were numerous systemic emboli, including emboli in the right retinal and coronary arteries. An unproven, but possible, case of coronary-artery embolization during operation was described in 1961.[4] There was difficulty in defibrillation and the ECG showed an ischemic pattern. The patient's recovery was complicated by continued signs of myocardial damage on ECG. In this instance there was no attempt to diagnose the causative factor at operation.

To our knowledge, this is the first report of a case of intraoperative embolization of the coronary arteries arising from a left atrial myxoma in which early diagnosis and treatment averted permanent myocardial injury. This occurrence further emphasizes the need for careful measures to prevent such embolization, as well as the need for constant patient monitoring.

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A Possible Hazard in the Use of a Scavenging System

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Scavenging systems are incorporated into anesthetic circuits in order to protect personnel from possible hazards related to exposure to anesthetic gases. Such a scavenging system has presented a hazard to the patient.

Report of a Case

A 9-year-old boy was anesthetized for reduction of a dislocation of the left elbow and fractures of the ulna and radius. A circle-absorber system was used, with a Dupaco Clean OR§ scavenging system (fig. 1). The patient was breathing spontaneously through an endotracheal tube.

X-ray films were taken after attempted reduction. As the anesthesiologist turned to seek protection from x-ray exposure it was noticed that the rebreathing bag (*A* in fig. 1) had collapsed completely. This was corrected by flushing the system with oxygen.

When a second set of x-ray films were taken, the hazard was prevented by disconnecting the scavenging bag (*B* in fig. 1).

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§ Dupaco Clean OR Exhaust Collector, #39935, Dupaco Incorporated, P.O. Box 98, San Marcos, California 92069.

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Discussion

This scavenging system consists of Dupaco§ valve (*C*), a disc valve (*D*) and a scavenging bag (*B*) connected to suction through a variable port or tap (*E*). The system is mounted on the expiratory limb of the anesthetic circuit.

Frequent adjustment of the valves (*C* and *D*) and the suction tap (*E*) is required. The disc valve (*D*) and the scavenging bag (*B*) are incorporated to act as a safety measure against excessive suction from the anesthetic circuit: the valve (*D*) is designed to open to room air should the pressure in the bag (*B*) fall.

In this case, valve *D* stuck in the closed position, admitting excessive negative pressure to the breathing system.

In such a situation, providing adequate minute volume depends upon equilibrium between the fresh gas inflow (FGI) and the suction. A slight change in any of the three components of this balance (increased uptake, reduced FGI, increased suction) could have affected the equilibrium. Closing the exhaust valve (*C*) or the suction tap (*E*) would have been equally illogical, preventing the collapse of the bag (*B*), but creating back-pressure in the circuit instead.

Disconnecting the bag (*B*) opened an alternative passage from the room to the suction, sparing the anesthetic circuit.

In this case the rebreathing bag (*A*) did not stay collapsed long enough to asphyxiate the patient, but this, however, is a possible hazard of the system.

The incorporation of this scavenging system into the anesthetic circuit, despite its potential benefits to the personnel involved in caring for the patient, adds two additional hazards to the patient himself should gas flow and suction not be evenly matched: one is overdistention of the rebreathing bag, with ensuing increase of intrathoracic pressure and potential pulmonary rupture; the other is total collapse of the bag with the possibility of asphyxiation. It is clear that the use of such a system mandates increased vigilance on the part of the responsible anesthesiologist.

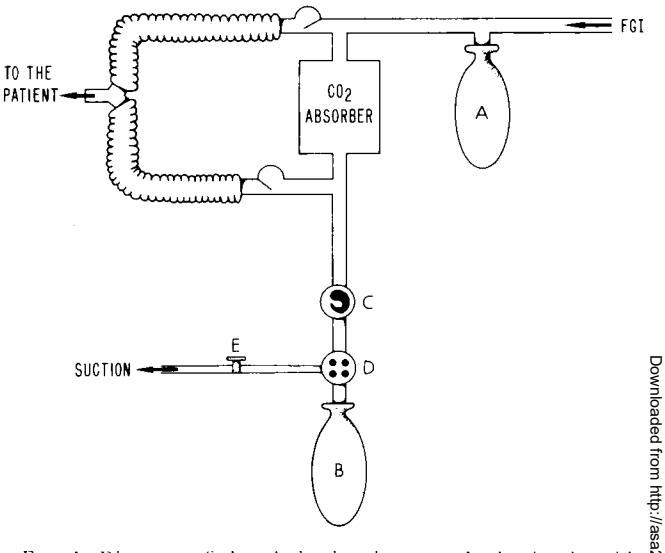

Fig. 1. Diagram of the circle-absorber anesthetic circuit, with a Dupaco Clean OR scavenging system mounted on the expiratory limb. *A*, rebreathing bag; *B*, scavenging reservoir bag; *C*, exhaust valve; *D*, disc valve (negative pressure relief, flexible flap type valve). FGI = fresh gas inflow.

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Anesthesia for Ligation of the Hepatic Artery in a Patient with Carcinoid Syndrome

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Ligation of the hepatic artery, a well-recognized though controversial procedure, has been used for treatment of primary and secondary tumors of the liver. That this procedure might be usedful as a palliative measure was first suggested by Markowitz in 1952.[1] Two years later, Breedis and Young demonstrated that the blood supply of malignant tumors of the liver was derived almost exclusively from the hepatic artery.[2] Nilsson, in 1966, found that hepatic dearterialization led to necrosis of tumor cells in both animals and man.[3] More recently, the effects of ligation of the hepatic artery and its therapeutic value have been confirmed in an extensive study of the hepatic circulation by Madding and Kennedy.[4] Patients with carcinoid syndrome whose symptoms are severe and unresponsive to current medical therapy may benefit from hepatic dearterialization, and good results have been reported following the procedure.[5] The anesthetic management of such cases may be complex due to the high incidence of complications in carcinoid patients undergoing anesthesia and the inevitable severe hepatic dysfunction of the early post-

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