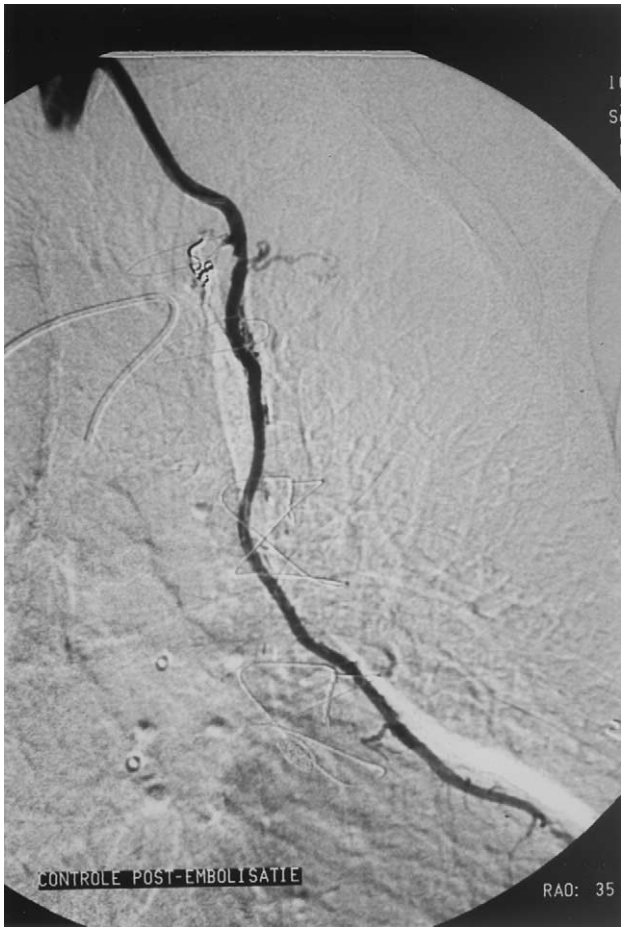

Fig 2. Embolization of the largest aberrant bronchial artery using polyvinyl alcohol particles and platinum flower microcoils.

and the pulmonary vasculature. In these cases, however, hemoptysis was not reported. Mostly, these patients experience recurrent angina as a result of a steal phenomenon by side branches of the internal mammary artery bypass graft [4–6].

With our patient, the large amount of blood did suspect an extensive bleeding in the lung after hematemesis was ruled out. Most likely, the aberrant bronchial side branches of the left internal mammary artery caused the lingular bleeding. The fact that the bleeding arose several years after the surgical procedure is quite remarkable. We suggest that a chronic elevated blood flow and intravascular pressure in a functional internal mammary artery bypass graft caused an erosion of the aberrant side branches into the lingular segment. Such progressively degenerative changes in these branches, which were not ligated during the initial CABG, could explain the interval between operation and event of hemoptysis.

Several studies demonstrate the value of embolization of the internal mammary artery side branches in case of recurrent hemoptysis, although no patients with post-CABG hemoptysis are reported in these publications [3]. With our patient, embolization of the major aberrant side branch was perfomed using polyvinyl alcohol particles and platinum flower microcoils. This was done carefully to avoid reflux of particles into the coronary artery or coil misplacement in the internal mammary artery. In this case, embolization was an acceptable alternative for reoperation and effective control of hemoptysis was obtained.

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CASE REPORTS

A Successfully Treated Case of Blunt Traumatic Right Coronary Ostium Rupture

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Cardiac tamponade due to coronary artery rupture, as a consequence of blunt trauma, is a rare but usually fatal condition. We successfully obtained primary hemostasis with emergency room thoracotomy, followed by delayed definitive treatment of the ruptured right coronary artery ostium in a motor vehicle accident victim with multifocal hemorrhagic lesions. Survival of patients with the described serious trauma has not been reported, and we discuss herein our treatment strategy.

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In more than half of the patients with cardiac trauma, the injury is reportedly fatal [1, 2]. Moreover, a surviving case presenting with cardiac tamponade due to massive coronary arterial bleeding has never been reported. We herein describe successful treatment of a patient with cardiac tamponade, which was finally diagnosed to be due to right coronary artery (RCA) ostium rupture.

A 34-year-old man was admitted to our department unconscious and in severe shock on March 13, 2002 after a vehicle collision. Echocardiography revealed massive hemopericardium. An emergent operation was performed at the emergency room through a median sternotomy. The pericardium was intact. After pericardiotomy, massive bleeding was found from around the ventriculo-infundibular fold of the right ventricle. The bleeding jet was colored brightly red, suggesting coronary artery rupture. Digital compression controlled the bleeding and hemodynamics stabilized. However, systemic heparinization for cardiopulmonary bypass (CPB) could be lethal because of possible other life-threatening hemorrhagic lesions, especially in the cranium, in such a multifocal trauma patient. Thus, a felt-buttressed 4.0 polypropylene mattress suture was successfully applied to the epicardium at the bleeding point without identifying the exact origin of the bleeding. The cardiac wall motion did not change after this procedure, although this maneuver could ligate the RCA. The median sternotomy was closed and the endotracheal tube was uneventfully withdrawn 5 hours later.

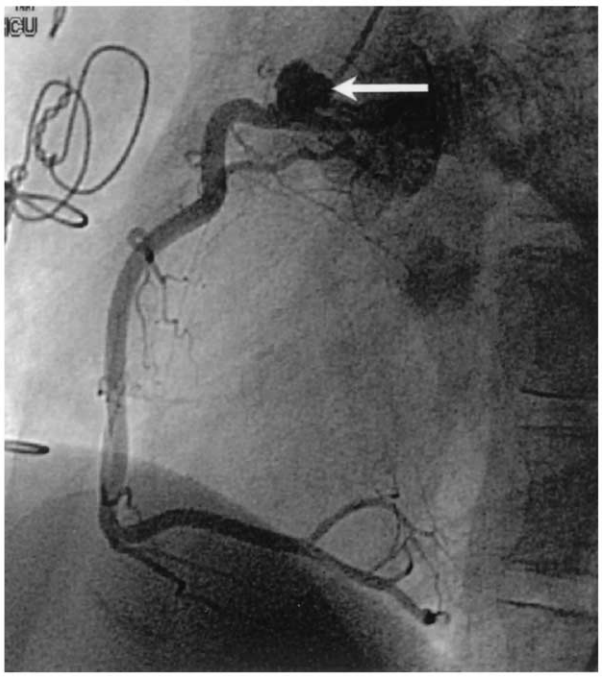

*Fig 1. Coronary angiography in the left anterior oblique view clearly revealing a pseudoaneurysm (*arrow*) originating from the right coronary artery.*

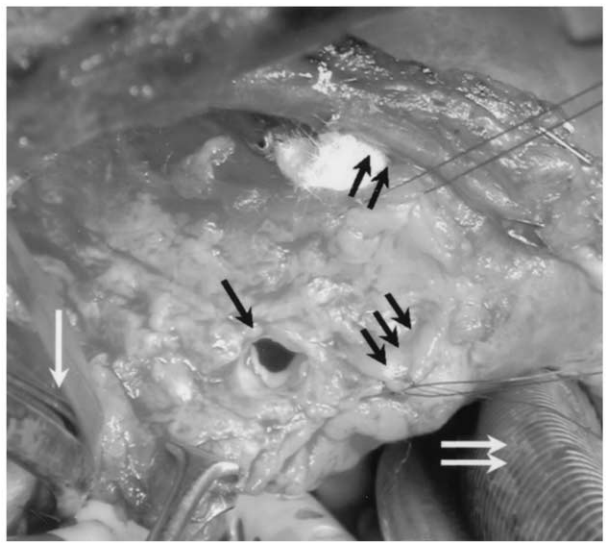

Fig 2. Surgeon's view of the heart in which the left side indicates cranial and the right side caudal. Single white arrow *indicates an aortic clamp;* double white arrows *indicate a venous cannula for cardiopulmonary bypass;* single black arrow *indicates coronary ostium tear located in the cranial semicircle of the ostium;* double black arrows *indicate the left internal thoracic artery graft; and* triple black arrows *indicate the right coronary artery ligated distally to the tear.*

Surgical repair of the crash fracture of the right leg was performed 1 week later and then the patient was rehabilitated. No other injury was found. Two weeks after admission, a coronary angiography revealed a pseudoaneurysm near the RCA ostium (Fig 1). The pseudoaneurysm was 10-mm in diameter and was thought to have originated from the injured RCA.

An operation to prevent rupture was performed through a re-median sternotomy on April 9, 2002. A left internal thoracic artery graft (LITAG) was anastomosed to the RCA with the aid of CPB. The right internal thoracic artery was not available because of the prior injury from the traffic accident. The aneurysm was not detected from the epicardial surface but a meticulous exposure finally revealed a tear of 4-mm diameter located at the cranial semicircle on the ostium of the RCA (Fig 2). This location was just beneath the pledgeted suture placed at the initial operation. The ostial tear was circularly trimmed and closed with a Dacron patch. The RCA distal to the tear was ligated. The patient was easily weaned from CPB and recovered well thereafter.

The postoperative evaluation revealed the closed RCA ostium (Fig 3), which clearly demonstrated the initial tear was located just at the ostium, and RCA flow was maintained through LITAG. The patient is now undergoing rehabilitation without any angina.

Comment

The occlusion of the proximal RCA or proximal left anterior descending artery due to an intimal tear as a

consequence of a blunt trauma has been reported [3, 4]. A rupture of the proximal RCA into the right atrium was also reported by Trotter and associates [5]. However, these reports refer neither to an ostium injury nor to fatal tamponade because of coronary artery rupture, as we have reported here. We report of a patient surviving traumatic free rupture of the coronary artery causing cardiac tamponade.

Because of other potentially fatal hemorrhagic lesions, including intracranial hemorrhage, systemic heparinization for CPB could be lethal in a multifocal blunt trauma patient. Thus, we applied buttressed suture hemostasis without identifying the exact bleeding site at the risk of acute myocardial infarction. Temporary cardiac arrest or ventricular fibrillation induced pharmacologically or electrically could have been applied for the identification of the bleeding origin. However, these tools could not provide sufficient time to repair the lesion definitively without CPB, even when RCA tear was identified. Thus, an attempt at using a buttressed suture involving the surrounding tissue was justified.

Although the initial hemostasis was successful without any infarction, a large pseudoaneurysm remained. This condition absolutely indicated the second surgery. Although Hwang and colleagues [6] reported that traumatic coronary aneurysm could conservatively be treated, the lesion they described differed from our patient in that it was not a pseudoaneurysm but a true aneurysm.

In summary, successful treatment of fatal cardiac tamponade due to RCA ostium rupture is reported, in which an initial buttressed suture hemostasis and a delayed definitive repair for a pseudoaneurysm formation under CPB were performed. Cardiac surgery necessitating systemic heparinization should be delayed until after treatment of other potentially life-threatening hemorrhagic lesions in a multifocal blunt trauma patient. Our treatment strategy was thus appropriate from the standpoint of initial damage control.

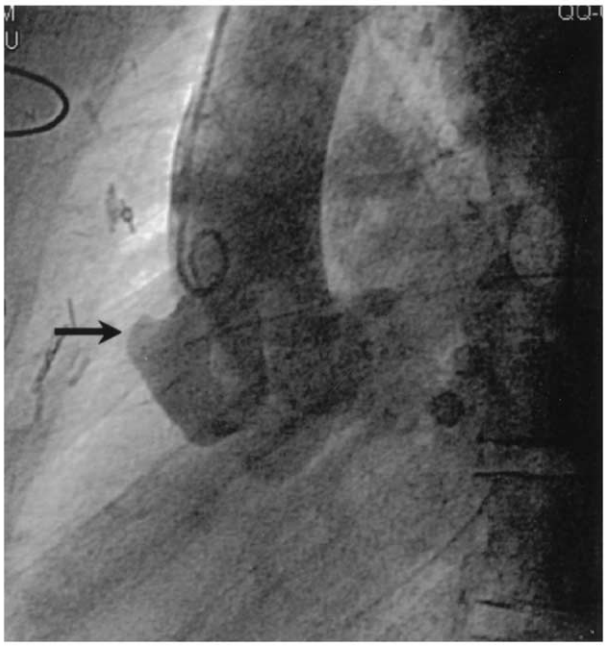

*Fig 3. Postoperative aortography shows the right coronary artery ostium (*arrow*) closed with patch.*

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CASE REPORTS

Aortic Valve Replacement in a Patient With Erythropoietic Protoporphyria

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Erythropoietic protoporphyria (EPP) is a disorder of heme synthesis that causes excessive accumulation of protoporphyrin. The predominant clinical feature is photosensitivity triggered by light at wavelengths near 400 nm. We describe a 52-year-old man with EPP who underwent aortic valve replacement due to severe regurgitation. To prevent burn injuries, astral lamps in the operating room were covered with yellow film filters. Preoperative autologous blood donation was not undertaken. Blood priming of the extracorporeal circuit was performed to maintain adequate hemoglobin concentrations, which resulted in reduction of heme synthesis. The patient was discharged in good health without any signs or symptoms of EPP.

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