Case report
Coronary artery spasm after coronary artery bypass grafting

Massimo Caputo, Francesco Nicolini*, Giorgio Franciosi, Roberto Gallotti
Department of Cardiac Surgery, ‘Istituto Clinico Humanitas’, Milan, Italy

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Abstract
We report a case of a 62-year-old man with severe manifestations of postoperative coronary artery spasm following effective coronary artery bypass grafting. The coronary artery spasm was manifested by ST segment elevation, hypotension and wall motion abnormalities on echocardiography. Urgent angiography confirmed the diagnosis and intracoronary infusion of nitroglycerine and verapamil relieved the coronary spasm. © 1999 Elsevier Science B.V. All rights reserved.

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1. Introduction
Coronary artery spasm has been recognized as a possible cause of perioperative myocardial ischemia after coronary artery bypass grafting and can be associated with circulatory collapse and death [1–3]. It is therefore very important to be aware of this possibility and at the same time to exclude other causes of postoperative myocardial ischemia, such as internal mammary artery spasm or anastomotic dysfunction.

We report a case of coronary artery spasm which developed a few hours after myocardial revascularization inducing both hemodynamic and electrocardiographic changes, recognized at urgent angiography and effectively treated with intracoronary and intravenous vasodilator infusion.

2. Case report
A 62-year-old man with a past medical history of exertional angina, hypertension and previous myocardial infarction was referred to the Department of Cardiac Surgery, ‘Istituto Clinico Humanitas’, with a diagnosis of unstable angina and intravenous administration of heparin, nitrates and diltiazem. In 1994, the patient had undergone percutaneous transluminal coronary angioplasty on the left anterior descending (LAD) coronary artery following an episode of severe anginal pain. Baseline angiogram (Fig. 1) showed a mildly impaired ventricular contractility, a 90% stenosis on the LAD involving the first diagonal branch, and a 90% proximal stenosis in the right coronary artery (RCA). The patient underwent a sequential left internal mammary artery (LIMA) anastomosis to the LAD and diagonal coronary artery and a right internal mammary artery anastomosis to the RCA. After an initial period of hemodynamic stability with normal electrocardiogram, the patient started to develop signs of antero-lateral myocardial ischemia, confirmed by transthoracic echocardiography and electrocardiography. Blood pressure fell immediately to 55/30 mmHg associated with ST-segment depression all over the precordial leads. Intravenous infusion of diltiazem (2 \( \gamma \text{/kg} \) per min) was commenced, together with glyceryl trinitrate which is routinely administered at a rate of 0.5–1 \( \gamma \text{/kg} \) per min after the operation. The persistence of ischemic signs prompted us to an urgent transfer of the patient to the catheterization laboratory. Coronary angiography demonstrated patent anastomosis with a diffuse vasospasm of the LAD and diagonal coronary artery, distally to the anastomotic sites (Fig. 2). Intracoronary infusion of nitrates and verapamil effectively resolved the coronary spasm (Fig. 3), with immediate electrocardiographic improvement. No elevation of creatine kinase MB levels was detected post-
Fig. 1. Pre-operative angiogram, showing the presence of significant stenosis of the LAD (*) and first diagonal (⊃) coronary arteries.

Fig. 2. Post-operative coronary angiogram showing the LAD (*) coronary artery spasm just distal to the LIMA-LAD (→) anastomosis and the first diagonal coronary artery spasm (⊃).
operatively and the patient was extubated 12 h later. The patient’s recovery was uneventful thereafter, and he was discharged home on the 7th postoperatively day on calcium-channel blocker therapy.

3. Discussion

Sudden circulatory collapse after coronary artery bypass may be due to coronary artery spasm. Several factors thought to provoke spasm may interact in the postoperative period, including high endogenous catecholamine levels, physical manipulation of a coronary artery during dissection for placement of a bypass graft and various mediators released during inflammatory response [4]. Previous reports [1–3,5] have emphasized the importance of an early diagnosis of coronary spasm, which can be the cause of severe, life-threatening hypotension soon after coronary artery revascularization. The use of echocardiography may identify left ventricular segmental dysfunction and the area of coronary artery involved more reliably than ECG. In our case, emergency coronary angiography was performed immediately after recognition of hemodynamic deterioration, in order to confirm our suspicion of coronary spasm, exclude graft failure and allow intracoronary administration of vasodilators. Calcium-channel blockers or nitrates directly infused into the involved coronary artery have been reported to be effective in most cases [6]. In this report, a combination of intracoronary nitrates and verapamil, continued as intravenous infusion in the intensive coronary care, resulted in successful management of acute postoperative coronary spasm, and was able to reverse the clinical, electrocardiographic and echocardiographic pictures.

In conclusion, our purpose in describing this patient’s case is to emphasize the importance of aggressive management in patients whose condition is unstable in the immediate postoperative period, following a routine and apparently successful operation. A high index of clinical suspicion, careful perioperative electrocardiographic and echocardiographic monitoring, and prompt angiography with specific intracoronary therapy are warranted in this potentially lethal expression of coronary-artery spasm.

References


