

An Alternative Treatment for Iatrogenic Coronary Perforation

To the Editor:

The perforation or rupture of the coronary artery during percutaneous intervention is a feared complication, despite its relatively low incidence (0.2%-0.8% of all interventions¹). This is due to its high mortality rate, and patients have a worse prognosis in the short- and medium-term than the total population undergoing revascularization procedures. Among the possible factors predicting its appearance are clinical ones (advanced age, female sex, kidney failure), angiographic factors (coronary artery calcification and tortuosity, and type-C lesions) and technique-associated factors (use of hydrophilic guides, atherectomy devices, optimization of PTCA outcome by the use of intracoronary ultrasound, high-pressure stent postdilatation). It is accepted that initial management first involves the inflation of an angioplasty balloon proximal to or at the level of the perforation to seal the leak and perform pericardiocentesis, if cardiac tamponade is present.

This would also allow intravenous protamine to be administered to counteract unfractionated heparin (if used). The approach from this point on is less clearly established, and it is possible to opt for conservative management, if the measures previously described solve the problem; otherwise, the patients might require urgent surgical intervention, which has the worst prognosis. Non-surgical alternatives include the use of conventional or coated (basically PTFE) stents and embolization with different materials: metal coils, coagulated blood from the patient, thrombin, or polyvinyl alcohol (PVA) particles.

We present the case of a 65-year-old male patient who presented non-ST-segment elevation acute coronary syndrome and was referred for catheterization. Coronary angiography showed full occlusion of unknown duration in the mediolateral segment of the right coronary artery (RCA) with good diameter, without being able to visualize the distal vessel (absence of collateral circulation), and without left dominance. In the absence of other coronary lesions, cardiological intervention was chosen using a hydrophilic guidewire which was advanced through the occlusion, ending in an RCA branch that was parallel to the main

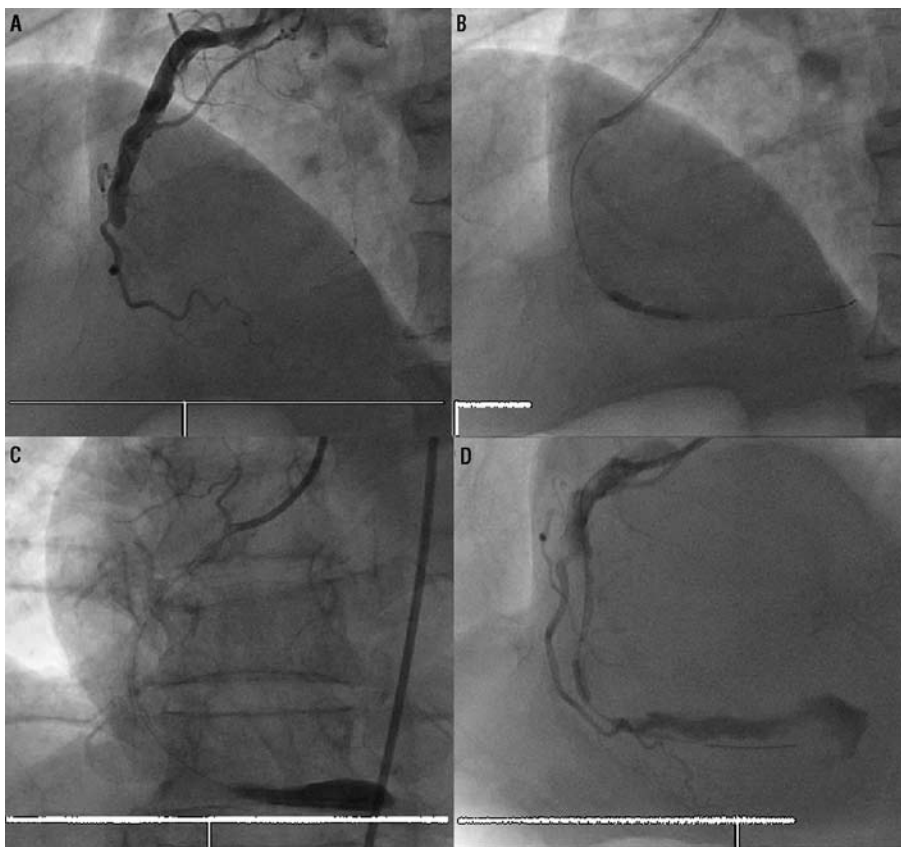


Figure 1. A: full occlusion of unknown duration in the mediolateral right coronary artery. B: advance of the hydrophilic guide and dilatation with a 2.5-mm×20-mm balloon in the right coronary branch parallel to the main vessel distal segment (this was not visualized due to the absence of collateral circulation); a notch can be seen in the central part of the balloon, which disappeared after increasing the pressure to 12 atm. C: perforation of the branch occurs, with formation of periaortic hematoma that progressively increases in size. D: finally, rupture of the vessel with contrast medium leaking into the pericardial cavity.

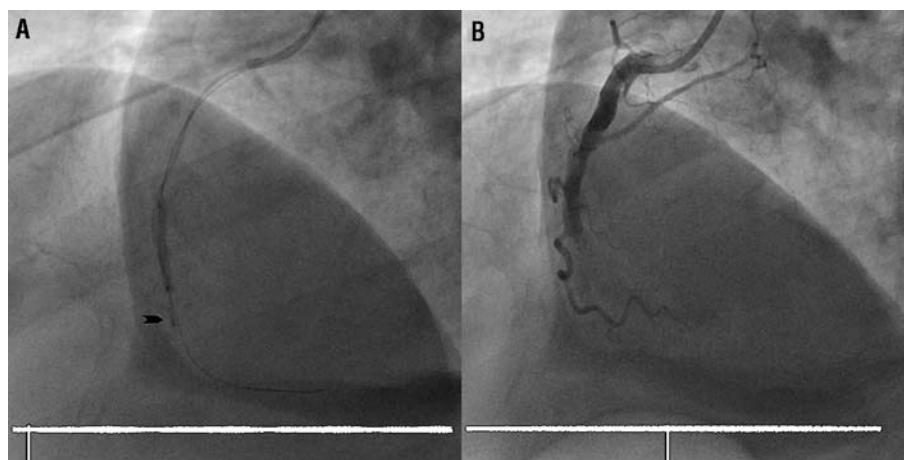


Figure 2. PVA particle injection through a microcatheter distal to the full occlusion of the right coronary artery (head of the arrow). B: the rupture is sealed and verified by the absence of contrast medium leaking into the pericardium.

vessel (erroneously identified as the vessel distal to the RCA). Dilatations with a 2.5-mm×20-mm balloon were initiated at the mid-RCA and distal to this. Distal inflation indicated a “notch” in the balloon—interpreted as a large plaque at this level—so pressure was increased until it disappeared (12 atm). This led to the branch becoming perforated and the contrast medium leaking into the pericardial cavity (Figure 1). Without removing the guide, prolonged inflation of the balloon was performed proximal to the rupture, and intravenous protamine was administered. Despite this, contrast medium kept leaking into the pericardial cavity in subsequent injections. Pericardiocentesis was not performed because there was no evidence of cardiac tamponade. Given that conservative measures did not succeed in sealing the rupture, distal embolization was performed using polyvinyl alcohol particles (Contour-PVA Embolization Particles, Target Therapeutics, Boston Scientific, USA) as an alternative to urgent surgery. A microcatheter was advanced up to the branch and particles were injected through the catheter while the angioplasty balloon was kept inflated in the mid-RCA segment to avoid reflux of the material. The perforation was successfully sealed (Figure 2). The patient recovered successfully and was discharged from hospital 4 days later with mild pericardial effusion in the monitoring echocardiogram.

Polyvinyl alcohol particles have been used for many years in interventionist radiology for all types of vascular embolizations. These particles are made of inert plastic and are biocompatible. They have a plain surface, are prepared as a suspension in saline solution and iodized contrast medium, come in different sizes (45 μm -1180 μm) and occlude small-caliber arteries.² Their use in coronary perforation is anecdotal (we only know of 2 previous cases in publication³), but they appear safe and may be useful

in cases like this one, where the need for urgent surgical repair was avoided.

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