Letter to the Editor

Should all coronary artery perforations be treated immediately?

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Coronary perforation is a rarely seen, but potentially lethal complication during coronary intervention. Frequently, the coronary perforation leads to communication of the coronary artery with the pericardial space [1]. We present a case of iatrogenic left anterior descending coronary artery (LAD) perforation into the right ventricle in an acute coronary syndrome setting.

A 43-year-old woman was admitted to our hospital with acute coronary syndrome. The clinical findings and electrocardiogram were suggestive of acute coronary syndrome. Coronary angiography showed 80% stenosis in the mid LAD (Figure 1). After administering unfractionated heparin at 70 U/kg for procedural anticoagulation and 600 mg of clopidogrel, the lesion was crossed with a floppy guidewire (0.014 inch), and a 2.75 × 32 mm drug-eluting stent (Promus, Boston Scientific, USA) was implanted at 18 atm without residual stenosis. Subsequent angiography showed an extravasation of contrast material clearing into the right ventricle (Figure 2). Pericardial effusion was not seen in echocardiography. The complication was defined as an iatrogenic coronary artery perforation into the cardiac chamber. The patient remained hemodynamically stable and the shunt volume was medium. However, she complained of angina pectoris, and therefore a 3.0 × 19 mm covered coronary stent (Graftmaster, Abbott Vascular, USA) was implanted (Figure 3). On the day of discharge, computed tomography coronary angiography (CTCA) was performed. The test showed that the perforated coronary segment was epicardial, without any myocardial bridge and coursed into the right ventricle (Figure 4). The patient was followed up in the outpatient clinic of our hospital, with a favorable course.

To our knowledge this is the second case of clinical presentation of an iatrogenic LAD perforation into the right ventricle during direct coronary stenting.

Coronary perforation into a cavity chamber is the rarest form of perforation. The perforation has more favorable hemodynamic and clinical outcomes than perforation into the pericardial space despite the worrying angiographic appearance [1]. In the literature, there have been a few patients in whom balloon angioplasty of the LAD resulted in coronary perforation and the development of an LAD–right ventricle fistula [2–6]. Demirsoy *et al*. reported a coronary rupture to the right ventricle during balloon angioplasty for myocardial bridge [6]. We found that the perforated coronary segment was epicardial without any myocardial bridge and coursed into the right ventricle.

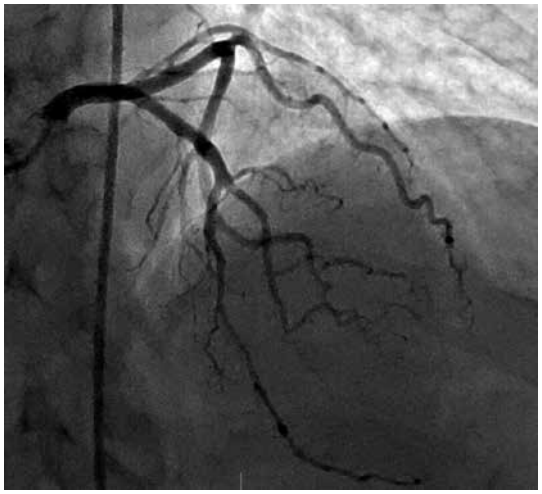

Figure 1. A long, calcified and eccentric critical lesion in the mid to distal left anterior descending coronary artery

The exact incidence of coronary perforation with stenting is unknown. First, Korpas *et al.* reported only one patient in whom vessel rupture following direct stent placement led to the development of a fistula between the LAD and the right ventricle [7]. They treated their patient with conservative management. Conservative management is a debated option in small iatrogenic fistulas. Spontaneous closures are very rarely seen even in small iatrogenic fistulas. In patients with serious complications it has been reported that medium or large fistulas are associated with volume overload and distal myocardial flow impairment, possibly leading to myocardial ischemia [8, 9]. Our patient was hemodynamically stable and the shunt volume was medium, but she had angina pectoris. Therefore, we implanted a stent graft without residual stenosis.

Figure 2. The appearance of extravasation of contrast material clearing into the right ventricle in coronary angiogram

The best treatment for coronary perforation, however, is prevention. In our patient, the cause of rupture was probably an oversized stent and high-pressure deployment. It is important to avoid oversized balloons/stents with high-pressure inflations and instead choose a smaller balloon/stent with which high-pressure deployment is safer. Therapeutic treatments include reversal of

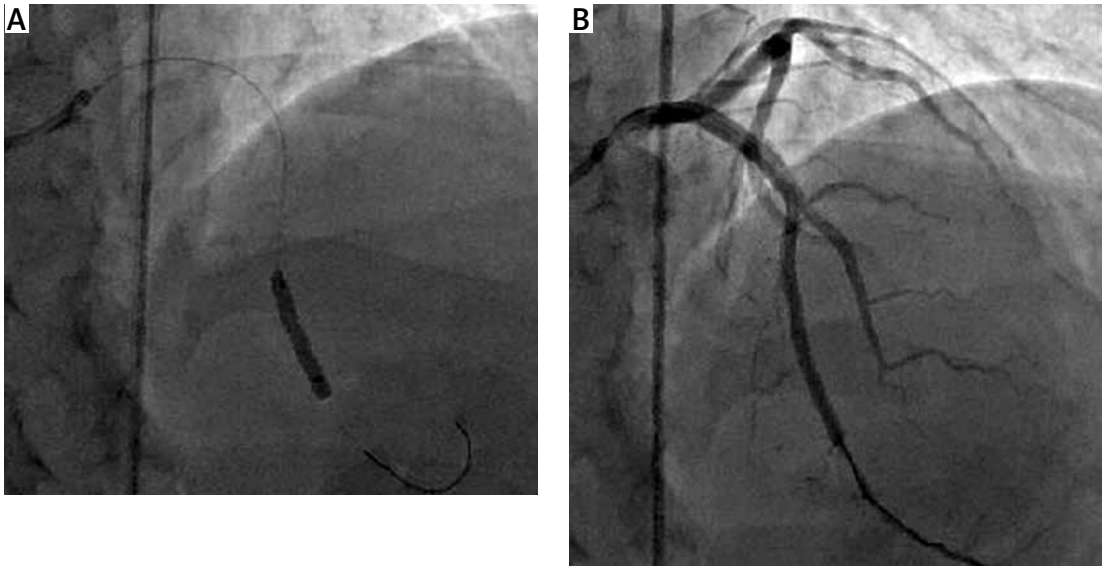

Figure 3. The course of perforated coronary segment without any myocardial bridge and into the right ventricle in computed coronary angiogram

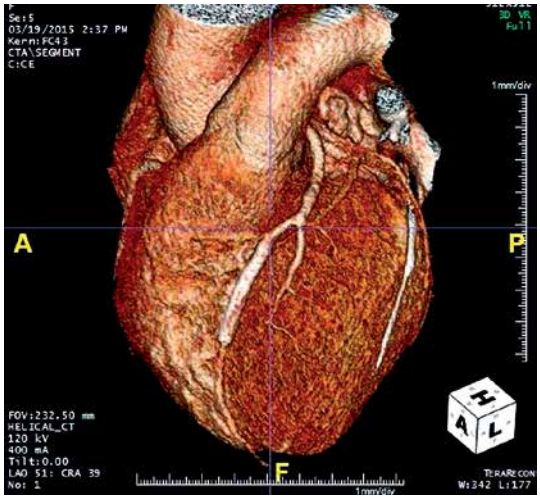

Figure 4. No myocardial blushing is seen on the angiogram after stent graft placement

anticoagulation, prolonged balloon inflation, covered stents and surgery, the choice depending on the severity of perforation and the patient's hemodynamic status [10]. If these patients are in a stable hemodynamic state, this situation can be managed conservatively. Also important criteria are both the size of the shunt on the perforation and hemodynamic stability on approach of the treatment.

If there are a small shunt and stable hemodynamic status in the patients, the perforation can be managed medically without the need for surgical intervention. However, if there are a medium or large shunt or hemodynamic instability and angina pectoris, the perforation should be managed with interventional procedures or surgery.

In conclusion, coronary artery perforation into cardiac chambers is an uncommon complication, and treatment options are still debated. However, the perforations have more favorable hemodynamic and clinical outcomes than perforations into the pericardial space despite the worrying angiographic appearance. The size of the shunt and hemodynamic status are important parameters on approach of treatment to the coronary-cavity perforation.

Conflict of interest

The authors declare no conflict of interest.

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