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Kasuistika | Case report

Iatrogenic coronary-right ventricular fistula complicated by coronary thrombosis

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SOUHRN

Perforace koronární tepny je vzácnou, nicméně potenciálně letální komplikací perkutánní koronární intervence (PCI); její řešení je náročné v případech, kdy k ní dojde uvnitř neroztažených stentů, případně za nimi, kam se krytý stent zavádí obtížně. Při perforaci dochází k propojení lumen koronární tepny s perikardiálním prostorem (což je častější případ), mnohem vzácněji s pravou nebo levou komorou [1]. Pro správnou léčbu je naprosto nezbytné okamžitě a přesně zjistit místo perforace a průběh extravasace [2]. V tomto článku popisujeme případ, kdy zbytečné manévry možná vedly ke vzniku další komplikace – koronární trombózy – jejíž farmakologické řešení je při současné perforaci koronární tepny složité.

ABSTRACT

Coronary perforation is a rare but potentially lethal complication during percutaneous coronary intervention (PCI) and its treatment is challenging when occurring inside or beyond unexpanded stents, where covered stent delivery is difficult. The perforation is a communication that occurs between the coronary lumen and more frequently the pericardial space, much more rarely the right or left ventricle [1]. An immediate recognition of the exact location and of the course of the extravasation is of utmost relevance for a correct management [2]. We here describe a case where excessive maneuvering may have caused a further complication – coronary thrombosis – the pharmacological management of which is cumbersome in the setting of a coronary perforation.

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A 74-year-old male patient underwent coronary angiography for non-ST elevation myocardial infarction (NSTEMI) with anterior ECG changes. Loading doses of aspirin and prasugrel were administered. The culprit lesion was identified as a long intermediate stenosis of the left anterior descending (LAD) coronary artery (Fig. 1), where a reduced fractional flow (FFR) reserve was documented (Fig. 2). The patient received 5,000 IU of unfractionated heparin, and a long bare metal stent (BMS) was deployed (Fig. 3). However, after stenting the FFR failed to normalize, and intravascular ultrasound documented unexpanded struts at the distal edge of the stent (Fig. 4). During high-pressure dilations at 20 Atm with a 2.5×20 mm balloon, coronary perforation, initially judged as Ellis et al. [3] type III (Table 1) – of the LAD was documented. The activated clotting time at that time was 213 s. One mg protamine was thus injected to reverse heparin, and the pericardiocentesis kit was prepared, ready for use. While preparing to cross the BMS with a covered stent, echocardiographic monitoring was performed, but no signs of pericardial effusion nor cardiac tamponade were detected. However, even prolonged balloon inflations failed to halt the extravasal blood leakage. A careful review of repeated angiograms in the postero-anterior (Fig. 5) and lateral views (Fig. 6) allowed appreciation that the contrast medium did not persist either around the vessel or in the pericardium, but outlined some trabeculation, and was quickly washed away through the pulmonary artery (arrowheads), suggesting a iatrogenic fistula from the LAD to the right ventricle (supplementary video available). With a slight counterclockwise rotation and deep intubation of the Vista Brite Tip® 6F XB 3.5 guiding catheter (Cordis Corp., New Brunswick, NJ, USA) inside the stent, and after several predilations with the Empira™ (Cordis) balloon, a Graftmaster™ (Abbott Vascular, Santa Clara, CA) 3.0×16 mm stent was successfully advanced and deployed to seal the coronary fistula. However, the patient started to complain of chest pain, the ECG showed ST segment elevation in leads V_2–V_6, and an acute stent subocclusive thrombosis was detected (Fig. 7). Abciximab (Reopro®) was administered, with an intracoronary bolus followed by a 12-hour infusion. Thrombus aspiration allowed to retrieve large fragments of red thrombus (Fig. 8) and, after postdilation of both stents, a good angiographic result was obtained (Fig. 9). The FFR at that point had normalized. The patient referred waning of the chest discomfort and was at that point transferred to the coronary care unit. Repeat echocardiograms confirmed the absence of any sign of pericardial effusion. The patient was discharged uneventfully after 5 days. Supplementary video related to this article can be found, in the online version, at doi: 10.1016/j.crvasa.2014.03.005.

Thirteen months later, the patient – still on aspirin plus prasugrel therapy (here prolonged beyond the usual 12 months for a decision of the general practitioner) – was admitted for an anterior ST-elevation myocardial infarction (STEMI). During the transfer he experienced a complete atrio-ventricular block, and a temporary pacemaker was positioned immediately at the arrival in the cath lab. Coronary angiography documented thrombosis of the LAD inside the covered stent (Fig. 10). A thrombus was at that time removed with a 6F QuickCat™ thrombus aspiration catheter (Spectranetics, Colorado Springs, CO), and a 2.75×15 mm Empira™ (Cordis) non-compliant balloon was inflated at 16 Atm with a good angiographic result and TIMI grade 3 flow (Fig. 11).

Table 1 – Perforation classification according to Ellis et al. [3]

TYPE I	Extraluminal crater without extravasation
TYPE II	Pericardial or myocardial blush without contrast jet extravasation
TYPE III	Extravasation through frank (> 1 mm) perforation
CAVITY SPILLING	Perforation into anatomic cavity chamber, coronary sinus, etc.

Two days later the temporary pacemaker was removed and the patient was discharged after further 3 uneventful days, still on aspirin and prasugrel.

Coronary perforation leading to a fistula directed to the right ventricle is a rare complication of PCI [1]. Diagnosis and location of this complication require prompt recognition. Unlike for spontaneous fistulas [4], spontaneous closures are very rare even in small iatrogenic fistulas, and conservative management is a debated option [2]. In isolated cases serious complications have been described: medium or large fistulas are associated with volume overload and/or distal myocardial flow impairment, possibly leading to myocardial ischemia [5]. On the other hand, the long term outlook after fistula closure is not well-defined.

As described here, coronary thrombosis may be a further complication of such cumbersome procedures, due to aggressive maneuvering and the tapering off of antithrombotic medications. Restarting such drugs is not advisable before sealing the perforation. Mechanical thrombus removal is mandatory, as it allows prompt flow restoration.

Conflict of interest

The authors declare that they have no conflict of interest.

Funding body

Financial support was not requested to conduct this study.

Ethical statement

Research was done according to ethical standards.

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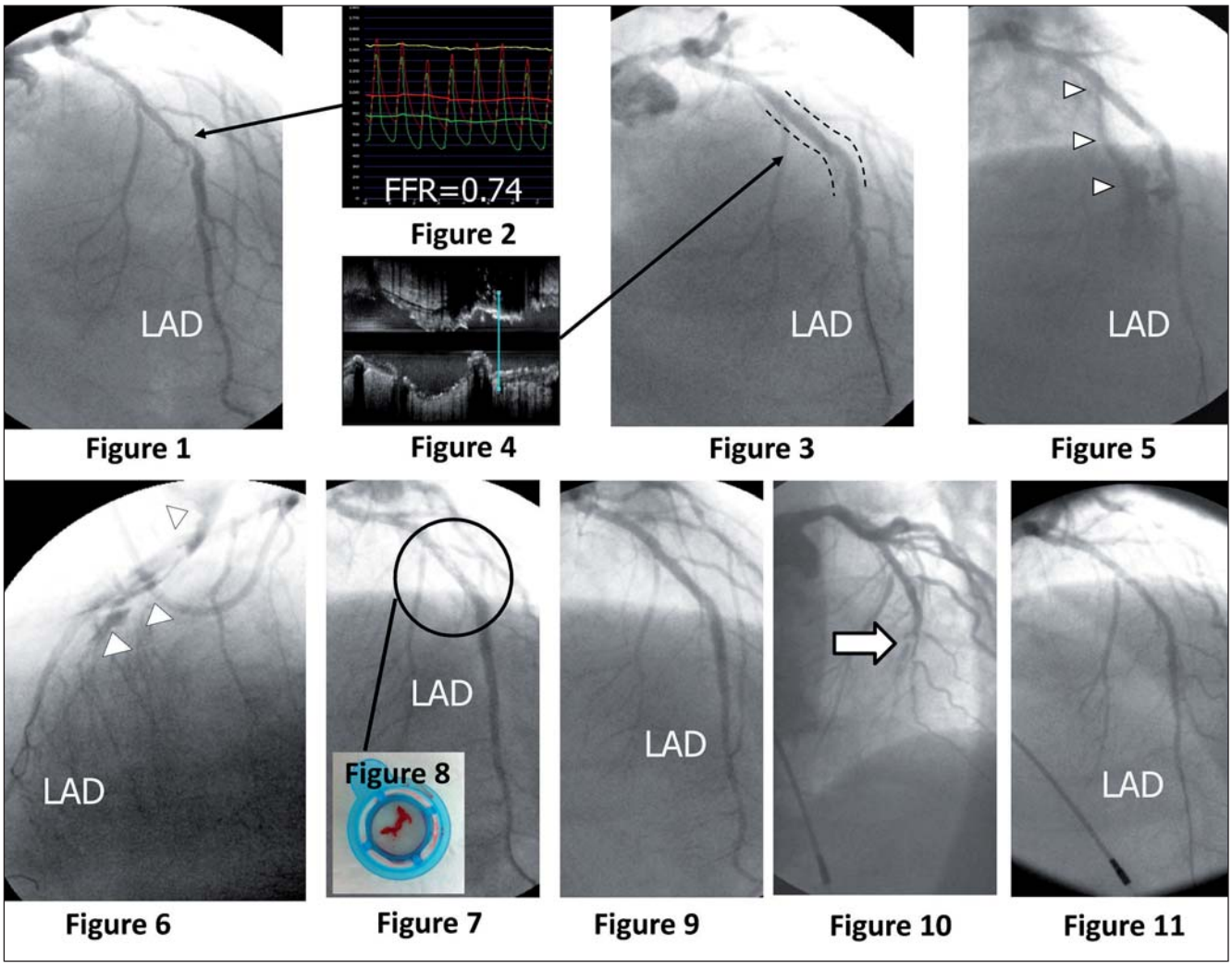

Fig. 1 – Coronary angiography allows detection of a long intermediate stenosis of the left anterior descending (LAD) coronary artery.
Fig. 2 – A pathological fractional flow reserve (FFR) is documented downstream to the LAD lesion.
Fig. 3 – A Biotronik Pro-Kinetic Energy™ 3.0×30 mm (dotted lines) is deployed.
Fig. 4 – Intravascular ultrasound documents unexpanded struts at the distal edge of the stent, at the site of a calcified plaque.
Fig. 5 – Cranial postero-anterior view. A large extravasal jet of contrast medium from the mid-portion of the LAD is documented. The opacification outlines some trabeculation and is quickly washed away through the pulmonary artery (arrowheads).
Fig. 6 – Lateral view – see above for details.
Fig. 7 – After a Graftmaster™ 3.0×16 mm stent positioning to seal the fistula, extensive stent thrombosis is detected (circle) inside the previously deployed stent.
Fig. 8 – Large fragments of red thrombus are retrieved from inside the stent.
Fig. 9 – Final result: grade 3 TIMI flow, without intracoronary filling defects nor contrast extravasation.
Fig. 10 – Repeat urgent coronary angiography after 13 months from the index event documents recurrent stent thrombosis (white arrow).
Fig. 11 – After thrombus aspiration and balloon inflation, a good final result is shown.