CLINICAL VIGNETTE

Stent graft fenestration for establishing and maintaining blood flow in the side branch

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Coronary artery perforation is a rare complication of angioplasty. Usually, it results in bleeding to the pericardium or myocardium with the subsequent cardiac tamponade or formation of an intramuscular hematoma, respectively.[1] Depending on the clinical condition, treatment may include prolonged balloon inflation, implantation of a covered stent, and, in some cases, postdilation with a larger balloon or implantation of a bigger "classic" stent into the covered stent. Alternatively, tissue glue or a coil can be used, or a cardiac surgery may be needed.[2,3] According to manufacturers, the currently available 2.5 to 5.0-mm covered coronary stents have the maximum diameter of 5.63 mm after expansion. The primary limitation associated with commonly implanted covered stents is the risk of side branch occlusion; thus, another treatment option, such as cardiac surgery, needs to be considered in patients in whom the occlusion of a major side branch is more likely.[4]

We present the case of a 77-year-old man with a history of hypertension, hospitalized due to symptoms of de novo heart failure. Echocardiography revealed segmental contractility disorders with a reduced left ventricular ejection fraction of 30% and moderate aortic valve stenosis. Coronary angiography showed 90% stenosis in the middle segment of the right coronary artery (RCA) (FIGURE 1A), which ramified into 2 equally large branches. No clinically significant narrowing was observed in the left coronary artery. Based on these findings, the heart team referred the patient for percutaneous coronary intervention of the RCA and recommended further monitoring of valvular disease.

In the presented case, the perforation occurred in the middle segment of the RCA, just above its bifurcation into 2 equally large branches. The perforation, which resulted in the opening of the fistula from the RCA to the right atrial appendage, occurred during the first kissing balloon inflation after the use of the crush technique. No pericardial effusion was observed (FIGURE 1B). A covered 3.5 × 26-mm PK Papyrus stent (Biotronik AG, Bülach, Switzerland) was implanted above the bifurcation; however, an extravascular blood outflow was still observed despite prolonged inflation with a 4.0 × 20-mm noncompliant balloon (Medtronic, Galway, Ireland). Hence, another 4.0 × 20-mm PK Papyrus stent graft (Biotronik AG) was implanted, covering the right posterolateral branch. Although the implantation of the second stent resulted in a decrease in contrast streaming, the blood outflow persisted despite further prolonged inflation with a 5.0 × 20-mm noncompliant balloon (Medtronic). After implantation of another covered stent in the posterior descending artery and resultant occlusion of the right posterolateral branch, the patient developed symptoms of inferior wall myocardial infarction, that is, ST-segment elevations with concomitant chest pain and hypotension. Hence, we attempted to restore the blood inflow to the right posterolateral branch with a guidewire for chronic total occlusion (Asahi Intecc Co., Seto, Japan) (FIGURE 1C). After the blood-impermeable layer and cell of the covered stent had been opened towards the side branch, a self-expanding stent

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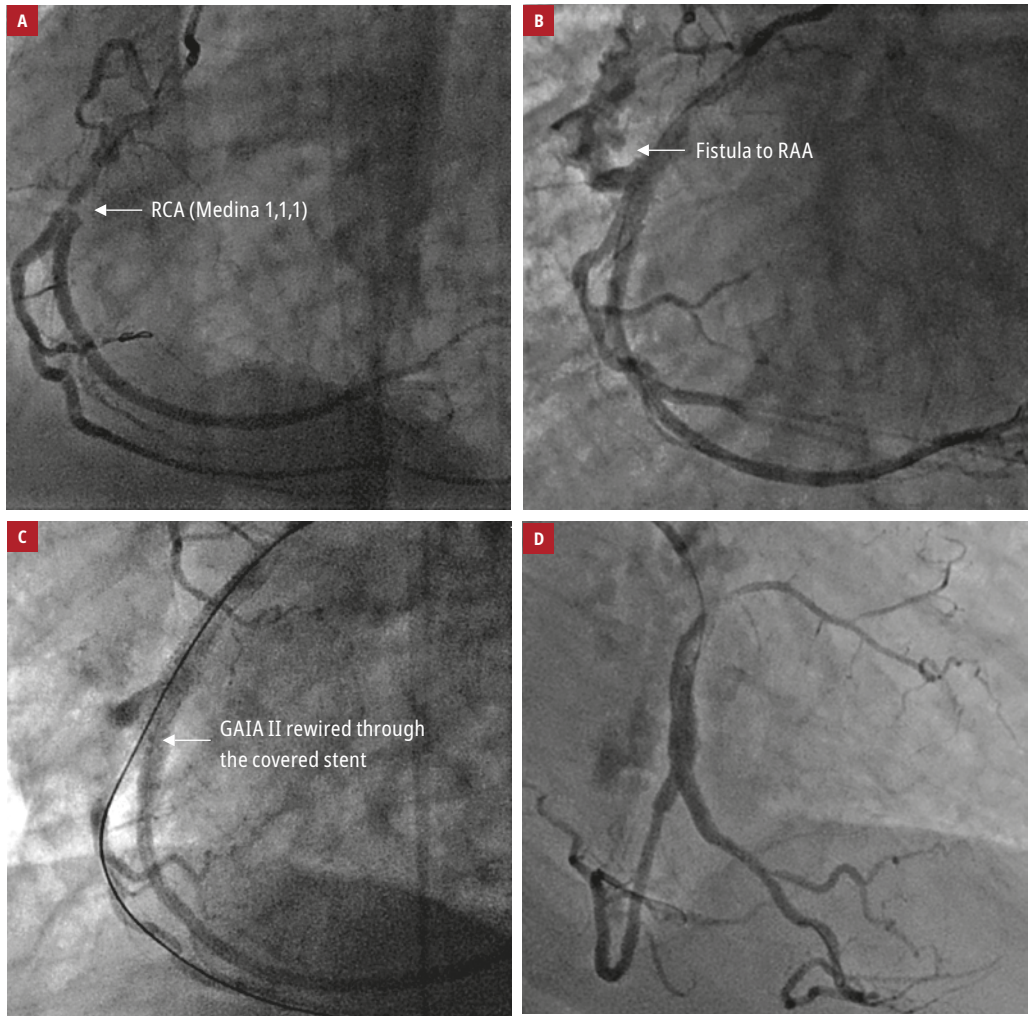

FIGURE 1 **A** – stenosis in the middle part of the right coronary artery (RCA); **B** – fistula from the right coronary artery to the right atrial appendage (RAA); **C** – rewiring through the covered stent; **D** – right coronary artery after stent implantation

(3.5–4.5 × 37 mm; Stentys SA, Paris, France) with the maximum diameter of 7 mm after expansion was implanted to dilate both covered stents. This resulted in stopping the extravascular blood outflow and establishing uninterrupted inflow to both branches of the RCA (FIGURE 1D), as confirmed by coronary angiography performed 7 days later.

Two take-home messages can be formulated based on the presented case: 1) access to an artery occluded by a covered stent can be restored; 2) to stop extravascular blood outflow, a covered stent can be dilated further with another large-diameter self-expanding stent.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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