

CORONARY STENT INFECTION: AN UNUSUAL COMPLICATION AFTER PERCUTANEOUS CORONARY INTERVENTION

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Abstract

Coronary artery stent infection (CSI) is one of the rarest complications associated with the percutaneous coronary intervention (PCI), usually requiring surgical intervention. Reaching and confirming the diagnosis remains the most challenging aspect of this complication. We describe a case of drug-eluting stents (DES) infection after several repeated procedures of primary angioplasty and stent implantation in the context of myocardial infarction. In the current era of growth of coronary stent implantation, it's important for clinicians to consider and to prevent such potentially fatal events. The diagnosis process remains difficult and requires the association of multiple clinical, biological and imaging parameters. Although medical treatment may be the only possible approach in some cases, we present a clinical case where surgical treatment was successful.

Keywords: Stents, prosthesis related infections, endovascular procedures, acute coronary syndrome, endocarditis

INTRODUCTION

Infectious complications following percutaneous cardiac interventions are known but not very common. Coronary stent implantation is associated with complications, though rare, such as stent infection or coronary aneurysms resulting from several mechanisms, and needing special investigations for their diagnosis and management. Simultaneous occurrence of CSI and mycotic aneurysm has been described in a few cases as an unusual life-threatening complication following coronary angioplasty. Most of the few reported cases had an unfavorable outcome, with the majority treated surgically¹.

We report a case of CSI after a few days of implantation. The management and outcome of our patient was quite similar from what was reported in the literature.

It is important for the interventional cardiologist to remember that such complication might occur and should

be prevented. If it does occur however, its treatment and outcome represent a challenge for clinicians.

CLINICAL CASE

A 60-year-old male patient with a history of myocardial infarction and primary angioplasty of the right coronary artery (RCA) in December 2018 (Figure 1A and 1B), was referred in August 2022 to our center from the emergency department for non-ST elevation myocardial infarction and chest pain. An urgent coronary angiogram with angioplasty of the right coronary artery (RCA) and placement of two drug-eluting stents (DES) was undertaken (Figure 2A and 2B). This admission was complicated by methicillin-resistant *Staphylococcus aureus* bacteremia related to phlebitis in the right arm, and he received antibiotic therapy with daptomycin. In December 2022 the patient was referred again to our center from the emergency department for non-ST elevation

myocardial infarction. An urgent coronary angiogram showed severe stenosis of the proximal RCA on which intervention was performed with DES implantation and in-stent restenosis of the middle RCA on which drug-eluting balloon angioplasty was performed (Figure 3A,3B and 3C). During the hospital stay he had no complications and the patient was discharged at day 2. Two weeks after discharge, he developed bacteremia with positive blood cultures for methicillin-resistant *Staphylococcus aureus*. Infective endocarditis was ruled out by transthoracic and transesophageal echocardiography as well as other infectious lesions by thoracoabdominopelvic CT and antibiotic treatment was instituted with daptomycin. However, since the fever persisted and the patient did not improve clinically the study was completed with a PET scan and a CT scan of the coronary arteries. The PET showed intense uptake of the stents implanted in the RCA compatible with an active infectious process (FIGURE 4A, 4B and 4C). Coronary arteries CT-PET scan showed increased density of pericoronary fat along the proximal RCA stents in the right AV groove, suggestive of an infectious process and corresponding to a hypermetabolic focus identified on PET.

Subsequently, after confirming the diagnosis of stent infection we discussed the case in a multidisciplinary meeting. The patient was referred for surgery to remove the stents and receive coronary bypass grafting. The RCA was opened longitudinally in its proximal and medial level and the stents were removed, but it was highly calcified and with a friable wall, so its repair was not possible. For this reason, double ligation of the coronary artery was performed at the proximal and medial level with two 4/0 polypropylene sutures, after removing the four stents previously implanted. The hemostasis of the ligated arterial segment was reinforced with biological glue. Subsequently, myocardial revascularization was performed with sequential saphenous bypass to the acute marginal and posterior interventricular artery distally to the ligated tract of the RCA. Surgical extracted material was cultured and confirmed stent infection by methicillin-resistant *Staphylococcus aureus* and *Staphylococcus hominis*.

The patient remained in the intensive care unit for 24 hours with a favorable immediate postoperative period without complications and was discharged from hospital after six weeks of antibiotic therapy. Five months after discharge, the patient came to the clinic for an initial check-up. The evolution had been good since the patient was asymptomatic and had not suffered any complication.

DISCUSSION

Coronary stent infection is one of the rarest complications associated with the percutaneous coronary intervention, occurring in less than 0.1% of cases. So far, all reported instances are limited to case reports. Coronary

stent infection presents itself in various, often confusing, ways in clinical settings².

Stent infection can occur early (less than 10 days) or late (10 days or longer) following coronary angioplasty and is frequently diagnosed in the context of an acute coronary syndrome due to stent thrombosis or coronary artery aneurysm. The diagnosis of coronary stent infection is confirmed based on the criteria proposed by Dieter³. The diagnosis is definitive when confirmed by autopsy or surgical specimen demonstrating an infected coronary artery stent, and diagnosis is possible if at least three of the following criteria are present: coronary artery stent placement in the preceding 4 weeks; multiple repeat procedures through the same arterial sheath or complications at the site of arterial puncture; significant fevers (>38,6 °C) in the absence of a known bacterial infection, documented bacteremia, leukocytosis in the absence of a known bacterial infection or acute coronary syndrome; acute coronary syndrome; cardiac imaging (CT, MRI, echocardiogram, etc.) consistent with persistent inflammation. In our case, the patient presented all Dieter's criteria for a possible and definitive diagnosis. Most of the similar reported cases were associated with a fatal outcome. In few cases, pericoronary hematoma with pericardial effusion can be present and it may be due to the coronary aneurysm leak or rupture. Irrespective of time of presentation, the majority of stent infection must be treated by surgical extraction of the stent with coronary artery bypass graft when indicated and with simultaneous intravenous antibiotic therapy for at least 4 weeks⁴. In our case, the follow up show signs of relapse so the patient was referred to surgery. In our case report the diagnosis was confirmed by tissue analysis and was highly probable based on the clinical, biological and imaging parameters.

A recent systematic review considered that coronary stent infection predominantly affected males of a wide range of ages. The most common symptoms were chest pain and fever with various onsets. Interestingly, CSI usually occurred during the first stent implantation. Cultures and coronary angiography were the most common methods used to diagnose CSI. Furthermore, DES had a higher risk of infection than bare-metal stents. Aneurysms were the most frequent abnormalities observed in infected stents. The bacteria that most often caused CSI were *Staphylococcus aureus* and *Pseudomonas aeruginosa*. More than 90% of the reports mentioned using various antibiotics, and 74% mentioned carrying out surgery. Finally, a mortality rate of 26.47% among CSI patients was calculated⁵.

PET/CT has a high sensitivity (91%) and specificity (97%) for the diagnosis of infective endocarditis of prosthetic valves, intracardiac devices and foreign materials such as stents, which makes it especially useful in these cases, in which anatomical complexity makes it difficult and many times it delays the diagnosis. However, stents often cause mild sterile inflammation and subsequent FDG-PET/CT uptake, affecting its sensitivity and specificity for diagnosing infection a few days after implantation. Thus



Figure 1

Coronary angiogram images before (A) and after (B) the first primary angioplasty and stent implant of the right coronary artery.



Figure 2

Coronary angiogram images before (A) and after (B) the second primary angioplasty and implant of two drug-eluting stents in the middle of right coronary artery.

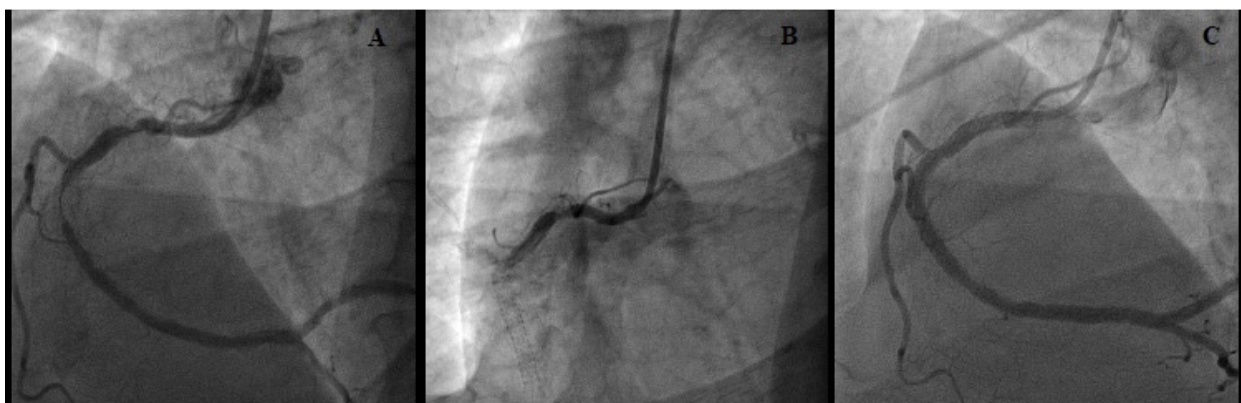


Figure 3

Coronary angiogram images before (A,B) and after (C) fourth stent implantation and drug-eluting balloon angioplasty on in-stent restenosis.

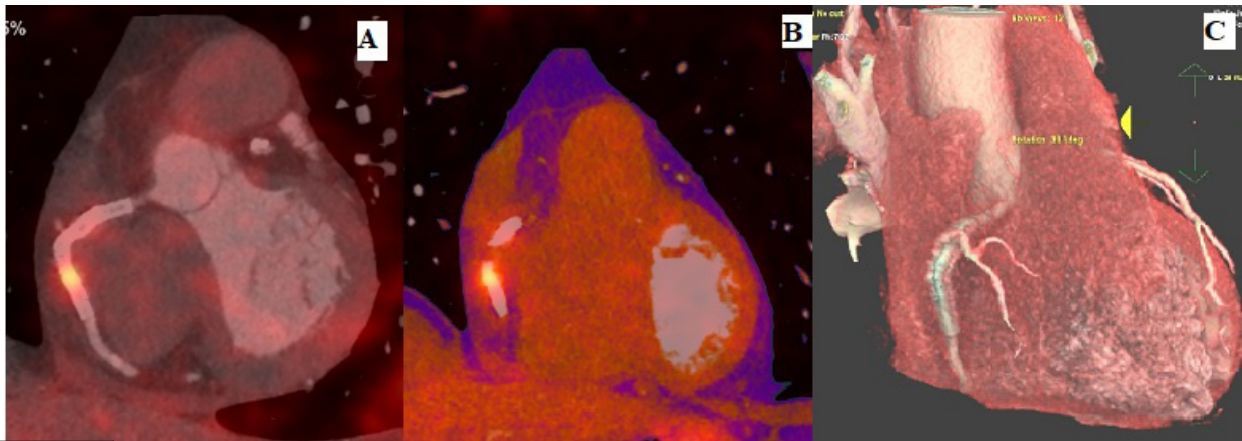


Figure 4

PET scan show intense uptake (A,B and C) at the level of the tract of the stents implanted in the RCA.

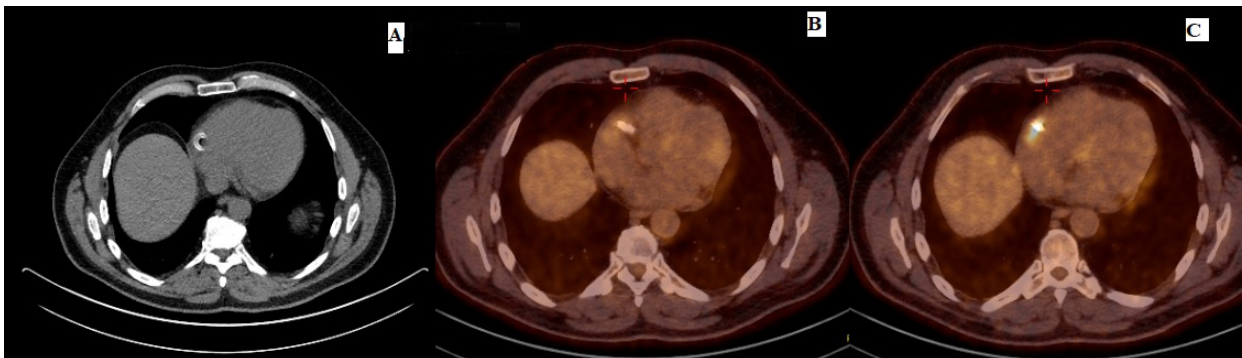


Figure 5

CT-PET scan show increased density of pericoronary fat (A,B and C) along the proximal RCA stents in the right AV groove.



Figure 6

Macroscopic images of the four stents removed in the surgical procedure.

not all infections can be diagnosed with FDG-PET. Besides, in current European Society of Cardiology guidelines for the management of infective endocarditis, FDG-PET/CT is included as a diagnostic technique in patients with suspected, but not definite, prosthetic endocarditis. In our case, since the patient continued without clinical improvement and fever, it was decided to complete the study with a PET/CT that showed data compatible with an infectious process, which further supported the diagnostic suspicion of stent infection⁶.

More than half of medically treated patients died versus 35% in case of surgery. To prevent such complications, adherence to aseptic precautions and treatment of pre-existing infections are of paramount importance⁷.

CONCLUSION

In conclusion, coronary stent infection must be considered whenever a patient develops fever and chest pain after stent implantation. Prompt and appropriate antibiotics treatment should be always initiated. Although medical treatment may be the only possible approach in extremely fragile patients, surgery can be very challenging in most cases.

CONFLICTS OF INTEREST

The author(s) declare no conflicts of interest.

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