

Coronary artery stent infection presenting as coronary cameral fistula: a case report

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Introduction

Coronary artery stent infection is a rare event. We report a case of delayed coronary artery stent infection with coronary cameral fistula presented as pyrexia of unknown origin, 1 year after coronary intervention.

Case Presentation

A 66-year-old man presented with paroxysmal low-grade fever of 2 years duration. He underwent percutaneous coronary intervention (PCI) with stent to right coronary artery (RCA) for inferior wall myocardial infarction in July 2014. He had non-ST-elevation myocardial infarction in December 2014. Repeat PCI with two stents to same vessel was done for total occlusion of stent. Repeated evaluations by family physician for fever did not yield any discrete diagnosis, and he was treated with empirical antibiotics. He had worsening of fever since last 2 months. Whole body positron emission tomography scan showed increased tracer uptake in RCA with perivascular abscess involving lateral wall of right ventricle. Coronary angiogram showed presence of small coronary cameral fistula from RCA draining into right atrium. Blood cultures grew *Pseudomonas aeruginosa*. He was taken for surgery and the infected portion of the RCA including the stents was removed.

Discussion

This case reports delayed coronary stent infection. Patient presented 1 year after procedure. Presence of bare metal stent increases risk of infection in presence of bacteraemia. Antiproliferative effects of drug eluting stents may predispose more to infection. This case was unique in its late presentation, presence of coronary cameral fistula and was successfully treated with surgery.

Keywords

Delayed coronary artery stent infection • Coronary cameral fistula • *Pseudomonas aeruginosa* • Case report

Learning points

- Coronary artery stent infection should be considered as a differential diagnosis in post-coronary intervention patients presenting as pyrexia of unknown origin.
- Positron emission tomography scan can be helpful for finding focus of infection along with routine diagnostic modalities like echocardiography.

Introduction

Percutaneous coronary intervention (PCI) with stent implantation is a common and widespread procedure for coronary artery disease. Stent infection is a rare complication associated with high morbidity and mortality, often necessitating open surgery.¹ Because of their antiproliferative effects drug eluting stents (DES) are associated with higher infection risk than bare metal stent (BMS).² *Staphylococcus aureus* is the most common causative organism of coronary stent infection, followed by *Pseudomonas aeruginosa*.³ Herein, we report a case of coronary stent infection presenting as pyrexia of unknown origin 1 year after the index coronary intervention. The patient also had coronary cameral fistula draining into the right atrium (RA).

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Timeline

July 2014	Patient underwent percutaneous coronary intervention (PCI) with drug eluting stent (DES) implantation to RCA for acute inferior wall MI.
December 2014	Developed acute coronary syndrome with total occlusion of RCA stent and underwent PCI to RCA with two DES.
Asymptomatic for next one year.	
December 2015	Started having paroxysmal low-grade fever. Was treated with empirical antibiotics with temporary symptomatic relief. Fever worsened in last two months.
CECT chest	Mild enhancing nodular lesions in the upper lobes of both lungs and the presence of mediastinal lymphadenopathy.
Whole body PET CT	Increased tracer uptake surrounding the proximal and mid segments of RCA and a perivascular abscess of size 3.7 × 4.2 × 2.7 cm involving the lateral wall of the right ventricle, adjacent pericardium, and right paracardiac region.
2D ECHO	Homogenous mass along the free wall of the right ventricle with continuous flow into the RA, superior to tricuspid valve. Vegetations over tricuspid valve leaflets.
CAG	Small coronary-cameral fistula of the RCA draining into the right atrium. Total occlusion of RCA stent with retrograde filling from left system.
Suregry	Removal of the RCA stent and debridement of the adjacent myocardial tissue. The RCA was clipped proximal and distal to the stent removal site. Vegetations over the tricuspid valve were removed through right atriotomy.
Postoperative recovery	Good, no recurrence of fever in 3 months of follow-up.

Case report

A 66-year-old man presented with paroxysmal low-grade fever for 2 years. Except for age, he did not have any common risk factor for coronary artery disease. He had a medical history of acute inferior wall myocardial infarction 3 years before the current presentation (July 2014), for which he had undergone emergency PCI of the right coronary artery (RCA) and DES implantation (Taxus Liberte, 3.5 × 24 mm, Boston Scientific). He had an uneventful post-procedure stay. Five months later, he presented with chest pain. His cardiac biomarkers were positive, suggestive of non-ST-elevation myocardial infarction. Repeat coronary angiogram revealed total

occlusion of the RCA stent. Repeat PCI of the RCA was performed using two DES (Promus Element 3.0 × 38 mm and 3.5 × 32 mm, Boston Scientific).

He was asymptomatic for 1 year, after which he started developing low-grade fever without any localizing signs or symptoms. Multiple evaluations for the fever by the family physician did not yield any discrete diagnosis. Empirical antibiotics led to symptomatic relief, but he continued to have breakthrough fever. He presented to us with continuous fever and chills for 2 months, with gradual worsening in the last few days. His vital signs were normal. There was no skin rash. Cardiovascular and respiratory examination was normal. Per abdominal examination revealed no abnormality. Comprehensive in-patient evaluation revealed leucocytosis (13 100 white blood cells/mm³, normal = 4000–11 000/mm³), neutrophilia, negative blood and urine cultures, and normal chest radiograph and abdominal ultrasound. Region-specific serology for infectious diseases such as malaria, dengue fever, enteric fever, brucellosis, and leptospirosis was conducted and found negative.

Contrast-enhanced computed tomography of the chest showed mild enhancing nodular lesions in the upper lobes of both lungs and the presence of mediastinal lymphadenopathy. A whole-body positron emission tomography-computed tomography (PET-CT) showed increased tracer uptake surrounding the proximal and mid segments of RCA and a perivascular abscess of size 3.7 × 4.2 × 2.7 cm involving the lateral wall of the right ventricle, adjacent pericardium, and right paracardiac region (Figure 1). Secondary dissemination of infection to the bilateral lung field and mediastinal lymph nodes, secondary splenomegaly, and reactive bone marrow hyperplasia were observed. Transthoracic echocardiography and transoesophageal echocardiography showed a homogenous mass along the free wall of the right ventricle with continuous flow into the RA, superior to tricuspid valve (Figures 2 and 3). Vegetations were present over tricuspid and pulmonary valve leaflets.

Based on the available information, the patient was diagnosed with RCA stent infection and secondary involvement of tricuspid and pulmonary valves with dissemination to lungs. Preoperative coronary angiogram confirmed the presence of small coronary-cameral fistula of the RCA draining into the RA (Figure 4). Repeat blood cultures showed growth of *P. aeruginosa*. The patient responded clinically to culture-guided intravenous antibiotic therapy (Injection Cefipime, Ciprofloxacin, and Gentamycin). He underwent surgery 2 weeks later. Of note, 2 days before the scheduled surgery, he had leucopenia and thrombocytopenia. Bicytopenia was considered secondary to sepsis after primary bone marrow pathology was ruled out by bone marrow biopsy. The patient underwent surgery through median sternotomy, using cardiopulmonary bypass and cardioplegic arrest. Operative findings included pericardial adhesions, inflamed fibrotic tissues around proximal, and mid segments of RCA and two small pedunculated vegetations over the tricuspid valve. No vegetations were observed over the pulmonary valve. The procedure involved removal of the RCA stent and debridement of the adjacent myocardial tissue (Figure 5). The RCA was clipped proximal and distal to the stent removal site. Vegetations over the tricuspid valve were removed through right atriotomy. Coronary cameral fistula opening into the RA (2 × 2 mm in size) was closed with a prolene suture.



Figure 1 PET-CT scan showing increased tracer uptake surrounding the right coronary artery stent.

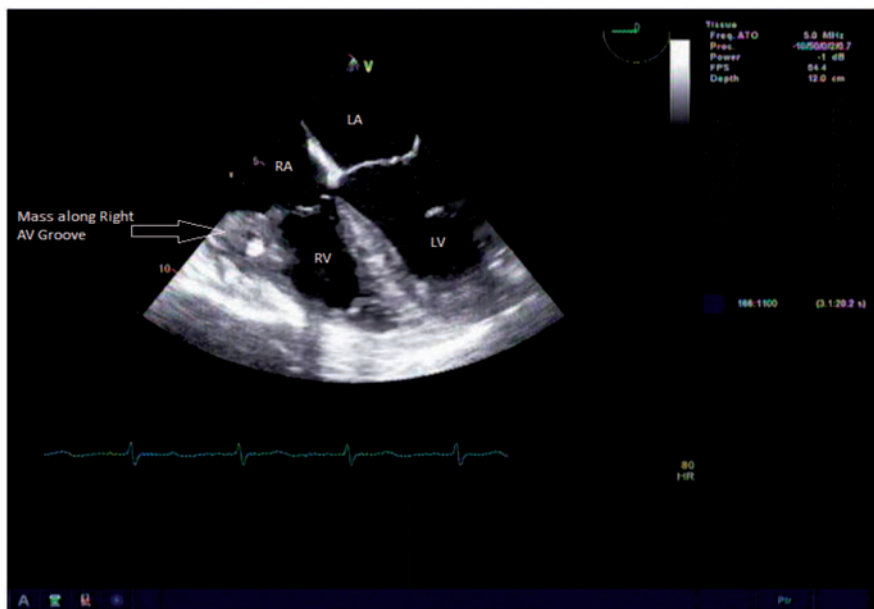


Figure 2 Transoesophageal echocardiography showing mass in the right atrioventricular groove.

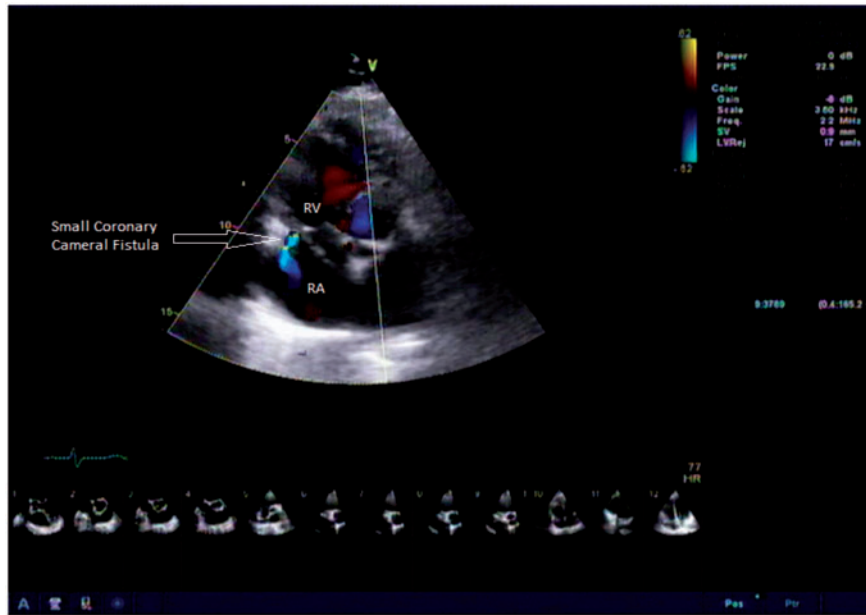


Figure 3 Transthoracic echocardiography showing coronary cameral fistula.

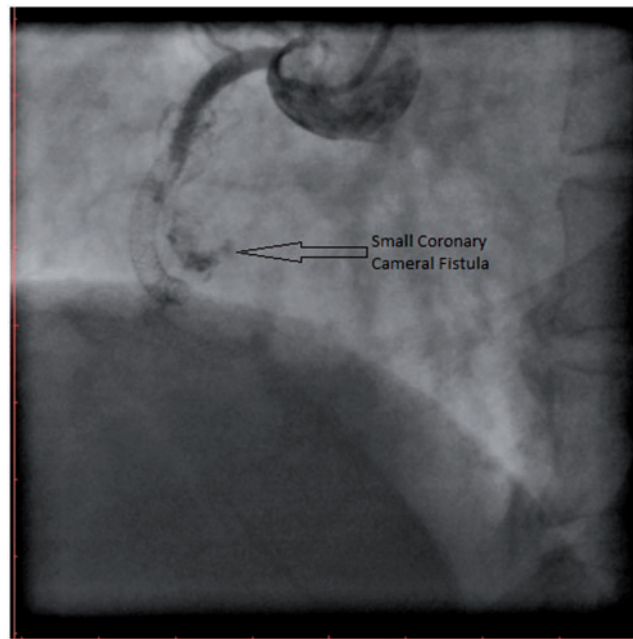


Figure 4 Coronary angiogram showing small coronary cameral fistula.

In view of chronic total occlusion and good retrograde filling through collaterals from the left system, revascularisation of the RCA was deferred. We also wanted to avoid the potential risk of vein graft infection. The culture of the resected segments of stents was negative. Postoperative recovery was favourable, with no recurrence of fever in 3 months of follow-up.

Discussion

This article reports the case of a patient with delayed coronary stent infection. He presented to us 3 years after the procedure and diagnosis was made with the help of whole body PET-CT scan, TOE, and positive blood culture.



Figure 5 Stent along with arterial wall after excision.

The first coronary stent infection was described in 1993.⁴ To date, 29 cases of coronary stent infection have been reported worldwide.⁵ The precise pathophysiology of stent infection is not yet understood. Presence of metal stent in the coronary artery increases the risk of infection during bacteraemia.^{6,7} It can lead to acute inflammation of the arterial wall and thrombosis.⁶ Both balloon dilatation and metal stent implantation can injure the endothelial surface. Areas of endothelial loss at the stent implantation site may allow bacterial penetration into the arterial wall. In addition to endothelial injury, the stent may act as a nidus for bacterial adherence.⁷

Neointima formation acts as barrier to prevent infection.¹ Because of its antiproliferative effects, which interfere with neointimal growth, DES may be associated with a higher risk of infection than BMS.² Habib *et al.*⁸ demonstrated delayed arterial healing with minimal neointimal formation, persistent fibrin, and incomplete endothelialization in DES compared with BMS. In this study, some of the DES remained unhealed for as long as 40 months. After the introduction of DES in 2003, the incidence of stent infection has increased. Of the 24 cases of coronary artery stent infection reported after 2003, 16 cases had DES implantation and only eight had BMS implantation.⁵

Elieson *et al.*³ defined coronary stent infection as early and late onset depending on whether it presents before or after 10 days of stent implantation. They also emphasized that early surgery should be considered in late-onset stent infections, whereas in early-onset infections, medical therapy alone can be used initially unless major complications are present. The most common causative organism of coronary stent infections is *S. aureus*³ (both methicillin-resistant and methicillin-sensitive *S. aureus*), followed by *P. aeruginosa*, as in our case. Coronary stent infection is associated with high mortality, as reported by Bosman *et al.*⁵ and Lim *et al.*⁹ (48.3% and 43.5%, respectively).

This case was unique in its late presentation, presence of coronary cameral fistula, and local invasion of the tricuspid valve, and it was successfully treated with surgery. It is less likely that the infection was acquired during the procedure as the patient developed fever almost

1 year after PCI. Probably, some systemic infection with bacteraemia lead to seeding of the organism on incompletely healed endothelial surface over the stent. The coronary cameral fistula may have acted as the conduit for the spread of infection to the tricuspid valve, from where pulmonary valve and lungs were involved with secondary septic emboli. *Pseudomonas* is a ubiquitous nosocomial pathogen. It often has an indolent clinical course and all aseptic precautions should be taken to prevent this iatrogenic infection. Although reports of late-onset coronary stent infection have been published,¹⁰ we could not find any report of coronary stent infection leading to coronary cameral fistula.

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.

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