

## Post-infectious pseudoaneurysm after coronary angioplasty using drug-eluting stents

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### ABSTRACT

Pseudoaneurysms may represent a risk for serious unfavorable outcomes. Pseudoaneurysm of the coronary arteries is also associated with about 80% of coronary stent infections. We present the case of pseudoaneurysm of the left circumflex coronary artery, due to infection with *Staphylococcus aureus* after drug-eluting stents implantation. Coronary stent infection can present as a mycotic aneurysm or pseudoaneurysm as in this case.

**Key words:** Coronary artery, Drug-eluting stent, Percutaneous coronary intervention, Pseudoaneurysms

The prevalence of pseudoaneurysms of the coronary artery in patients undergoing angiography is 0.2–10% [1]. Besides atherosclerosis, there are various etiologies for coronary artery pseudoaneurysms such as coronary artery dissection, trauma, infection, and congenital malformations [2]. Pseudoaneurysms may represent a risk for serious adverse outcomes since they can lead to complications such as thrombosis with distal embolization, rupture, cardiac tamponade, and myocardial infarction [3,4]. Drug-eluting stent (DES) can pose an inherent risk of pseudoaneurysm development by delaying or preventing vascular healing by inhibiting neointimal hyperplasia and by inducing a reaction of hypersensitivity at the point of contact with the coronary endothelium [5,6]. Coronary stent site infections are rare and are presumed to be the result of either direct stent contamination at the time of delivery or transient bacteremia from the access site [7]. We present a case of pseudoaneurysm of the left circumflex (LCX) coronary artery, due to infection with *Staphylococcus aureus* after DES implantation.

### CASE REPORT

A 56-year-old male former smoker (around one pack of cigarettes for the past 15–20 years), hypertensive, dyslipidemic on treatment presenting with acute inferior wall myocardial infarction, thrombolysis with streptokinase successfully without complications having sinus rhythm, and normal left ventricular

(LV) systolic function undergone coronary angiogram which showing right coronary artery (RCA) dominant vessel with proximal and distal segment 70–80% stenosis. LCX is an ectatic vessel with 80% stenosis in proximal and distal LCX. Left anterior descending artery is type -II vessel with about 50% lesion in mid part and a non obstructive plaque in the diagonal. There was no preceding history of chronic infection or immunosuppression.

Percutaneous transluminal coronary angioplasty was undertaken with the insertion of a DES to RCA (Yukon flex choice 3 × 21) and LCX (Yukon flex choice 4 × 18 proximally and Yukon flex choice 3.5 × 16 distally) in standard fashion with cefuroxime given periprocedure. The post-procedure angiogram revealed a good result with the entire procedure being uneventful and lasting 40 min (Fig. 1). He was discharged on the 3<sup>rd</sup> day on dual antiplatelet aspirin and prasugrel.

Four weeks later, he returned with pyrexia (99–100.5°F) and symptoms of angina of about 2 weeks duration which was similar to those at initial presentation with fresh electrocardiography changes and raised cardiac biomarkers (Fig. 2). He had consulted a local physician and already taken antibiotics for 2 weeks without any relief.

He was admitted and performs blood biochemistry, total and differential counts, blood for culture, and sensitivity sent to rule out the cause of prolonged pyrexia. In view of angina, a coronary angiogram was performed that revealed a patent stent in the proximal RCA and distal LCX stents along with the appearance of a pseudoaneurysm at the distal edge of the proximal LCX stent. The leukocyte count was 15,900/mm<sup>3</sup> with neutrophilia. The erythrocyte sedimentation rate was 26 mm/h,

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and C-reactive protein was positive. Echocardiography showed moderate hypokinesia anterolateral wall, distal IVS with LV ejection fraction 35% with no evidence of pulmonary venous hypertension or pneumonia on chest X-ray. Blood and urine cultures were sterile and negative for covid-19.

He had taken oral antibiotics, 5 days of augmentin 1 g twice a day, then 5 days of cefixime 200 mg twice a day, and inj. ceftriaxone 1 g twice a day  $\times$  5 days, and in the hospital, he was continued with inj. ceftriaxone 1 g twice a day and blood cultures were sent, which came negative twice, after that, his antibiotics were changed to piperacillin/tazobactam 4.5 g thrice a day. Treatment options were sought and the treatment for pseudoaneurysm for a covered stent, but in view of prolonged pyrexia, a possibility of infected pseudoaneurysm

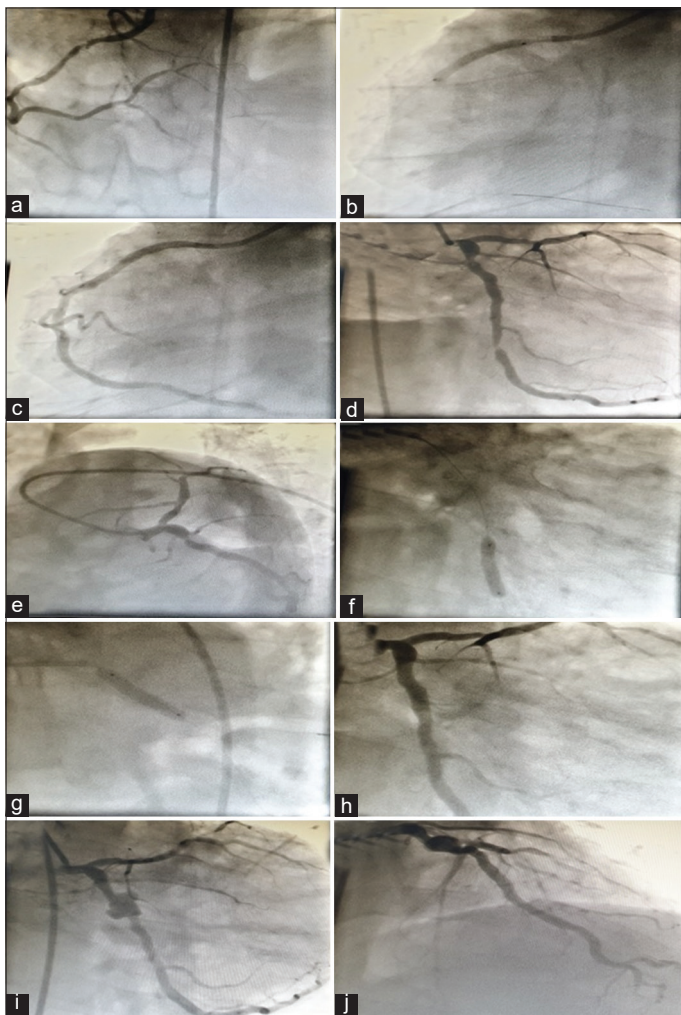
was made and a surgical option was taken. The case discussed with the surgical team was of the opinion that the patient will be taken for bypass, a stent will be retrieved, debris will be flushed out, Lex will be repaired, and venous graft will be given to the lex.

He was taken up for emergent surgery as patients persisting with pyrexia. The patient underwent surgery as planned, but he continued to have a fever and developed oliguria, and later succumbed on the 3<sup>rd</sup> post-operative day.

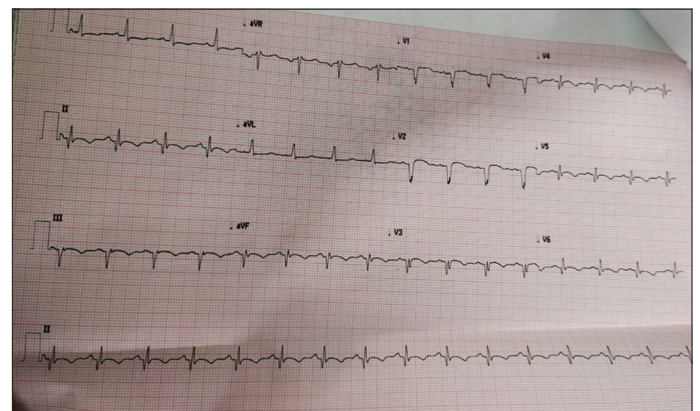
## DISCUSSION

Coronary stent infection can present as a mycotic aneurysm or pseudoaneurysm, as in this case, the patient presented with myocardial abscess and pericarditis with pericardial effusion. Angiography and angioplasty-related bacteremia occur in 1% of patients. However, in a prospective study assessing the frequency of bacteremia after a cardiac catheterization, Banai *et al.* found an incidence of 7.3% immediately after diagnostic catheterization and 4.6% immediately after percutaneous interventions (PCIs) [8]. Four hours later, positive blood cultures occurred in 3.9% after diagnostic catheterization and in 4.1% after PCI. DES may predispose more to infection because of their immunomodulating and antiproliferative effects [9].

Impairment of local host defense mechanism and endothelialization of the stent struts might increase the susceptibility to infection. Coronary aneurysms have been reported from 3 days to 4 years after DES implantation [10]. DES stents inhibit neointimal growth by eluting the drug locally, delay reendothelialization, and further may influence the remodeling process that leads to late incomplete stent apposition. Although coronary aneurysms may develop as a result of exaggerated positive remodeling of the vessel wall, the underlying pathophysiology remains unknown [10]. In some patients, this phenomenon has been linked to bacterial arteritis or other rare predisposing factors such as Kawasaki disease. Moreover, DES stents may aggravate inflammation and elicit hypersensitivity reactions leading to aneurysm formation. Thus, mechanical factors, such as residual dissections, arterial wall injury caused by oversized balloons and stents, high-pressure



**Figure 1:** (a) Proximal right coronary artery (RCA) disease with 90%, mid-RCA 60–70% disease, and distal RCA plaquing; (b) proximal RCA is stented with Yukon flex choice 3  $\times$  21 at 12 atm; (c) post-PTCA TIMI 3 flow achieved in RCA; (D) RAO caudal view showing left circumflex (LCX) ectatic vessel with disease in proximal and distal; (e) LAO caudal view showing mid-left anterior descending artery 50–60% disease and plaquing in diagonals. Proximal LCX 90% disease; (f) Yukon flex choice 3.5  $\times$  16 deployed in distal LCX at 14–16 atm; (g) Yukon flex choice 4  $\times$  18 deployed in proximal LCX at 16–18 atm; (h) post-stenting TIMI 3 flow achieved in LCX; (i) 4 weeks later, coronary angiogram RAO caudal views showing pseudoaneurysm at the distal edge of proximal LCX stent and patent distal LCX stent; (j) giant pseudoaneurysm at the distal edge of proximal LCX stent on coronary angiogram



**Figure 2:** Four weeks later, the patient presented with fever with angina and new-onset electrocardiography changes

inflations, and atherectomies, complicated procedures, contained perforations, or even vessel ruptures have all been associated with early aneurysm formation (pseudoaneurysms may actually develop) after PCI [10].

Finally, it has also been suggested that DES-related coronary aneurysms might predispose to DES thrombosis. Of note, stent malapposition seems to be more frequent after DES than after bare-metal stent implantation, while factors such as DES implantation in acute coronary syndromes, long lesions, and chronic occlusions predispose to malapposition. A previous study suggested that late malapposition represents a pure intravascular ultrasound (IVUS) finding without clinical symptoms, although incomplete apposition may indeed constitute a risk factor for late DES thrombosis [10].

After DES implantation, continuous clinical surveillance under prolonged dual antiplatelet therapy might be indicated, further supported by the possibility of spontaneous aneurysm resolution. Patients with larger total vessel areas and larger areas of malapposition have a poorer prognosis. Therefore, the fate of the coronary aneurysm seems to depend on its size, and in this regard, IVUS appears to be superior to angiography.

## CONCLUSION

In cases of aneurysm thrombosis, aggressive approaches such as balloon overdilation, coiling, covered stents, or further surgical excision might prevent further devastating complications. Regarding infected aneurysms, antibiotic therapy remains the mainstay of treatment, while it remains to be proven if early surgical intervention may result in an improved outcome in these patients. A radiolabelled leukocyte scan could be used early to confirm the diagnosis if conventional imaging fails to identify the source of infection.

## REFERENCES

1. Lakshmanadoss U. Novel Strategies in Ischemic Heart Disease: BoD-Books on Demand; 2012.
2. ElGuindy MS, ElGuindy AM. Aneurysmal coronary artery disease: An overview. *Glob Cardiol Sci Pract* 2017;2017:e201726.
3. Kar S, Weibel RR. Diagnosis and treatment of spontaneous coronary artery pseudoaneurysm: Rare anomaly with potentially significant clinical implications. *Catheter Cardiovasc Interv* 2017;90:589-97.
4. Li X, Wang Y, Wang D, Lai C, Wang C. The evolution of left ventricular pseudoaneurysm from the rupture of left ventricular free wall following acute myocardial infarction: A case report. *BMC Cardiovasc Disord* 2020;20:5.
5. Vijay S, Srivastava D, Tiwari B, Misra M. Coronary artery aneurysms following drug eluting stents implantation: A retrospective analysis from series of cases at tertiary care cardiac centre over three years. *Heart India* 2019;7:110-7.
6. Nakao F, Kanemoto M, Yamada J, Suzuki K, Tsuboi H, Fujii T. A rare case of complete stent fracture, coronary arterial transection, and pseudoaneurysm formation induced by repeated stenting. *Case Rep Cardiol* 2015;2015:192853.
7. Mahmood MS, Rahman MA, Zahangir NM, Basak RK, Khan MM. Successful management of a giant mycotic coronary artery aneurysm developed after multivessel PCI with drug-eluting stent. *Bangladesh Heart J* 2020;35:66-70.
8. Banai S, Selitser V, Keren A, Benhorin J, Shitrit OB, Yalon S, *et al.* Prospective study of bacteremia after cardiac catheterization. *Am J Cardiol* 2003;92:1004-7.
9. Lim CP, Ho KL, Tan TT, Wong AS, Tan JW, Chua YL, *et al.* Infected coronary artery pseudoaneurysm after repeated percutaneous coronary intervention. *Ann Thorac Surg* 2011;91:e17-9.
10. Alfonso F, Pérez-Vizcayno MJ, Ruiz M, Suárez A, Cazares M, Hernández R, *et al.* Coronary aneurysms after drug-eluting stent implantation: Clinical, angiographic, and intravascular ultrasound findings. *J Am Coll Cardiol* 2009;53:2053-60.

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