

# Infections of Intravascular Bare Metal Stents: A Case Report and Review of Literature

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## WHAT THIS PAPER ADDS

It is becoming more common to treat peripheral arterial diseases endovascularly with bare metal stents (BMS), often with high success rates. However, complications such as BMS infections do occur and have high morbidity (17.2–75.3%) and high mortality (32.5%). This study presents a case report of a BMS infection and an extensive review of literature of all BMS infections (coronary and peripheral) reported up to the present day. This review gives an insight into the risk factors, signs and symptoms, useful imaging techniques, treatment options, and (treatment-specific) mortality.

**Objective:** The objective of the paper is to present a case of an infected bare metal stent in the left common iliac artery that was removed by an urgent operation, and to review the literature on diagnosis and outcome of infected coronary and non-coronary metal stents.

**Methods:** A systematic search of the Medline database was performed with the purpose of identifying risk factors, signs and symptoms, imaging strategies, and treatment modalities of bare metal stent infections, both coronary and peripheral.

**Results:** In total, 76 additional studies/case reports (48 non-coronary; 29 coronary) were included and analyzed. Intravascular bare metal stent infections are a rare but serious complication, often leading to emergency surgery (overall: 75.3%; non-coronary cases: 83.3%; coronary cases: 62.1%). In 25.0% of the non-coronary cases, infection led to amputation of an extremity or removal of viscera. Reported mortality was up to 32.5% of the cases (non-coronary: 22.9%; coronary 48.3%). Physicians should always be suspicious of a stent infection when patients present with aspecific symptoms such as fever and chills after stent placement. Additional imaging can be used to detect the presence of a pseudoaneurysm. A PET-CT is an ideal medium for identification of a stent infection.

**Conclusions:** Intravascular stent infection is associated with a high risk of morbidity and mortality. Surgery is the preferred treatment option, but not always possible, especially in patients with a coronary stent. In selected cases, bare metal stent infections may be prevented by the use of prophylactic antibiotics at stent placement.

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## INTRODUCTION

Percutaneous transluminal angioplasty (PTA) with bare metal stent placement has become a very popular treatment modality for stenotic lesions, after being successfully introduced in humans in 1983.<sup>1–3</sup> The success is largely because of its minimally invasive character, rendering this an ideal treatment option for patients with multiple comorbidities. However, a stent infection is a rare complication with a high morbidity and high mortality, which may

necessitate maximal invasive surgery.<sup>4</sup> The current study consists of a case report of a bare metal stent infection, which occurred in Rijnland Hospital, Leiderdorp, The Netherlands, when a stent was placed after prolonged thrombolysis (48 hours) through the same sheath, and of a systematic literature search, in which 76 additional cases of intravascular bare metal stent infections (coronary and peripheral) were identified. Risk factors, signs and symptoms, useful imaging techniques, treatment options, and mortality were identified and reported.

A 50-year-old woman without any significant comorbidities was admitted to the emergency department of Rijnland Hospital with a cold, pale, and painful left lower leg. She was woken by an acute onset of the pain, which also radiated to her back. Physical examination showed a pale lower leg without palpable pulsations of the dorsalis pedis

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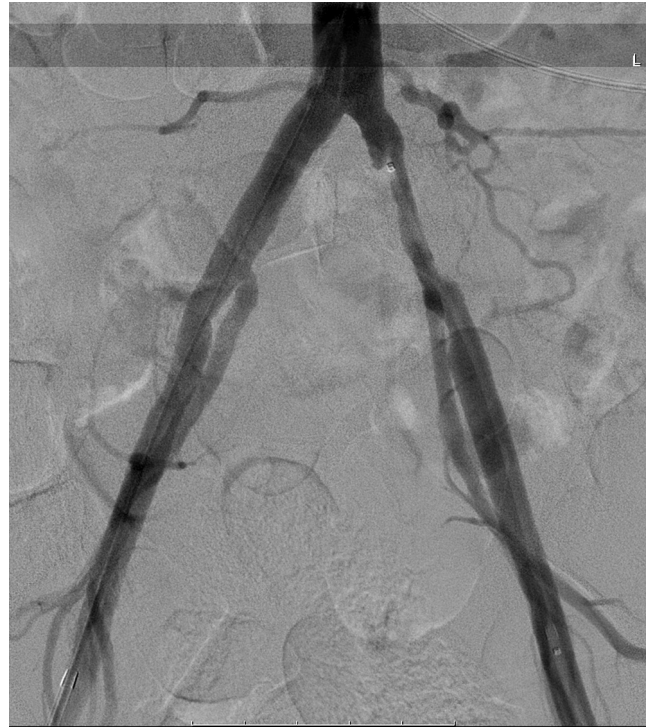
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**Figure 1.** Antegrade angiography on presentation on the emergency department showing an occlusion in the left common iliac artery. A retrograde catheter is placed in the left femoral artery, through which urokinase is administered.

or the posterior tibial artery. Weak pulsations were palpable over the popliteal and femoral artery, and capillary refill was prolonged (6 seconds). The patient was clinically diagnosed with an acute arterial occlusion and an angiogram was performed through a contralateral puncture in the right groin. It showed an occlusion of the left common iliac artery (CIA) reaching to the iliac bifurcation and a thrombus in external iliac artery (Fig. 1). The popliteal artery was occluded by an embolus. The crural arteries were not visualized. Subsequently, a 6 Fr sheath was placed in a retrograde fashion in the left common femoral artery to recanalize the occlusion in the CIA and urokinase treatment was started (bolus 100.000 IE and continuous infusion 100.000 IE/h). The urokinase was sprayed in the thrombus through a valved infusion catheter (Cragg-McNamara Valved Infusion Catheter, EV3, Plymouth, MN, USA). After 24 hours a control angiogram was performed, which showed a successful recanalization of the occlusion in the left CIA with a persistent 40% stenosis over 4 cm length and a minimal embolism remaining in the popliteal artery (Fig. 2). Thrombolysis was continued for another 24 hours.

Control angiogram, 48 hours after starting the thrombolytic therapy, showed a persistent 40% stenosis in the CIA and a successful thrombolysis of the iliac, popliteal artery and crural arteries. To prevent a new occlusion, a nitinol stent (S.M.A.R.T. Control nitinol stent; Cordis Corporation, Bridgewater, NJ, USA) was placed in the left CIA (Fig. 3). After the placement of the stent, the sheath was removed and a pressure bandage was applied for 12 hours according



**Figure 2.** Control angiography at 24 hours of thrombolysis. The left common iliac artery is 60% patent and the thrombolysis is continued for another 24 hours.

to standard hospital protocol. The patient was discharged from the hospital the day after without any symptoms.

Four weeks later the patient was re-admitted with symptoms of tenderness in the left buttock and leg, a warm, slightly swollen left knee, and a fever ( $T 39^{\circ}\text{C}$ ). On the ventral side of her leg there were multiple petechiae. The inguinal area was unremarkable without hematoma or lymphadenopathy and peripheral pulsations were present. Her blood analysis showed a CRP of 248 mg/L, a leukocytosis of  $14.2 \times 10^9/\text{L}$  and a BSE of 68 mm/h. A septic arthritis of the knee was excluded through a synovial puncture by an orthopedic surgeon. After taking blood cultures, clinical treatment with intravenous antibiotics (cefuroxim 750 mg 3dd1, gentamycin 400 mg 1dd1) was started. During admission the diagnosis of endocarditis was excluded by a cardiologist via a transthoracic echocardiogram. The blood cultures showed *Staphylococcus aureus*, after which the antibiotics were changed to flucloxacillin 12g/24h. After a week, a PET-CT was performed which showed an infected mass around the stent in the left CIA (Fig. 4A, B), a hydronephrosis of the left kidney caused by obstruction by the mass and no signs of further infection elsewhere. A standard CT-angiography (CTA) was performed, which confirmed a pseudoaneurysm with contrast leakage and the hydronephrosis (Fig. 4C).

Following the diagnosis of the infected stent, the patient was planned for surgery. The hydronephrosis was treated by an urologist by placing a double-J ureteral catheter in the left ureter. During the operation, a femoral–femoral crossover bypass was created using a rifampicin-coated

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