EJVES Short Reports (2017) 34, 28–31

CASE REPORT

Iliac Artery Reconstruction with Femoral Vein After Bare Metal Stent Infection

A. Quintas [a,b,*], G. Alves [a,b], J. Aragão de Morais [a,b], F. Bastos Gonçalves [a,b], J. Albuquerque e Castro [a,b], L. Mota Capitao [a,b]

[a] Department of Angiology and Vascular Surgery, Hospital de Santa Marta, CHLC, Lisbon, Portugal
[b] NOVA Medical School, Lisbon, Portugal

Introduction: Primary infection of a bare metal stent is a rare condition, associated with significant morbidity and mortality. Definitive treatment includes stent removal and arterial reconstruction.
Report: This study details a common iliac stent infection after re-intervention for iliac stent occlusion, complicated by pseudoaneurysm formation and septic embolisation. Potential risk factors for stent infection were identified. An open surgical resection of the affected artery along with all stent material was performed, followed by reconstruction with autologous interposition superficial femoral vein. There were no complications and no recurrent infection at 6 months follow-up.
Conclusion: Although rare, bare metal stent infection may occur, and a high index of suspicion is required. Stent surgical removal and arterial in situ reconstruction with autologous femoral vein proved to be a definitive procedure with no mid-term morbidity.

Article history: Received 13 November 2016, Revised 17 January 2017, Accepted 17 January 2017,
Keywords: Bare metal stent, Iliac stent, Stent infection, Pseudoaneurysm, In-situ reconstruction, Femoral vein

INTRODUCTION

Bare metal stents are routinely used for treatment of arterial occlusive disease in many territories. Primary iliac stenting is a standard treatment for atherosclerotic disease of iliac arteries, widely used and associated with acceptable long-term patency rates.

Stent infection is a rare complication, particularly with the use of bare metal stents compared with covered stents.[1] This complication is associated with significant morbidity (17.2–73.5%) and mortality (32.5%).[2]

This study reports a case of an iliac stent infection after treatment of in-stent restenosis, treated successfully by resection of the affected arterial segment and superficial femoral vein interposition. Potential risk factors are identified.

CASE REPORT

A 57 year old male, with a past medical history of hypertension, dyslipidaemia, current smoking habit, and peripheral arterial disease, was referred with Rutherford Classification category 3 chronic lower limb ischaemia. He presented with disabling left buttock and lower limb claudication.

Chronic total occlusion of the left common iliac artery was observed. Endovascular treatment was performed through percutaneous ipsilateral femoral access and a balloon expandable stent (9×60mm; Assurant Cobalt Medtronic, Inc) was implanted. The patency of the iliac segment was restored without any complications. A satisfactory clinical result was achieved with resolution of claudication.

The patient remained asymptomatic for 4 years, at which time his claudication recurred. An iliac stent occlusion was identified and a secondary endovascular intervention was planned in the angiography suite. A drug coat coated balloon angioplasty of the iliac stent occlusion was performed via ipsilateral retrograde femoral access, using an In.Pact Pacific (Medtronic, Inc) 7×80mm balloon. The control angiogram showed a suboptimal result with residual stenosis and a second 9×57mm balloon expandable stent (BeSmooth Peripheral Stent, Bentley InnoMed GmbH) was implanted.

Thirteen days after this second intervention the patient developed fever associated with collapse and left lower limb tenderness and pain. On physical examination there were skin signs of distal embolisation in the left lower limb (Fig. 1), extending to skin ulceration in some areas. The dorsalis pedis pulse was palpable.

Laboratory tests revealed a significant rise in inflammatory markers, with a C-reactive protein of 327mg/L, neutrophilic leukocytosis (18.7×10^3/μL leukocytes and 15.3×10^3/μL neutrophils), and D-dimers of 15815ng/mL.

* Corresponding author. Hospital de Santa Marta, Centro Hospitalar Lisboa Central, Serviço de Angiologia e Cirurgia Vascular, Rua Santa Marta nr50, 1169-024 Lisbon, Portugal.
E-mail address: anitaquintas@gmail.com (A. Quintas).

http://dx.doi.org/10.1016/j.ejvssr.2017.01.001

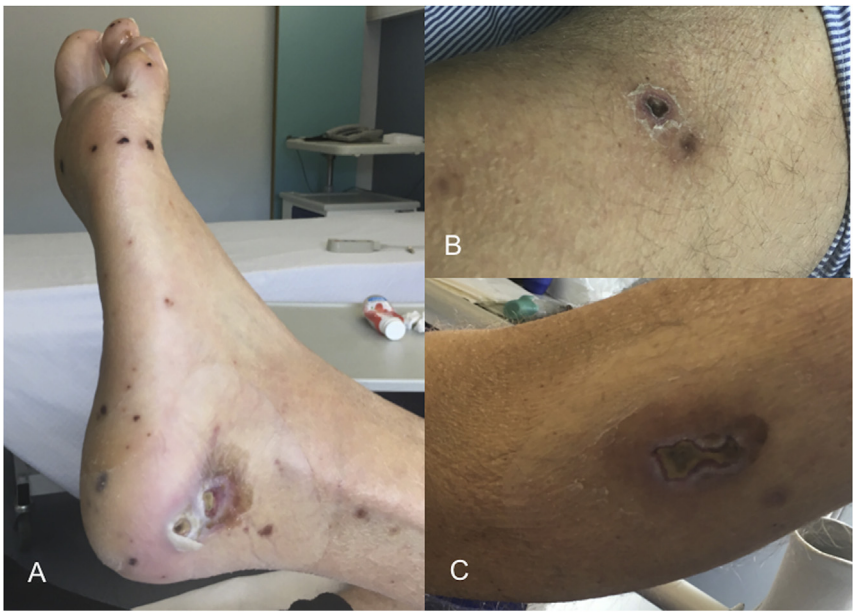

Figure 1. Skin lesions of septic embolism in the left lower limb (A: left foot; B: left thigh; C: left leg calf region).

Blood cultures were positive for methicillin sensitive *Staphylococcus aureus*. Echocardiography revealed no signs of endocarditis and no other organ involvement.

Computed tomography angiography showed a left common iliac artery pseudoaneurysm related to the stent implantation site, associated with peri-stent soft tissue inflammation (Fig. 2).

The presence of an arterial pseudoaneurysm in the iliac stent position, associated with ipsilateral septic embolisation and positive blood cultures, confirmed the diagnosis of iliac stent infection and surgical treatment was planned.

The patient started on broad antibiotic therapy with piperacillin/tazobactam (4g/500mg 8 hourly) and vancomycin (1gr 12 hourly) subsequently adjusted to ciprofloxacin (750mg 12 hourly) based on the antimicrobial sensitivity testing.

Resection of the implanted material and affected arterial segment and in situ reconstruction with autologous venous conduit was planned. The right superficial femoral vein was harvested (Fig. 3) and transperitoneal aorto-iliac exposure was performed through a midline laparotomy. The left common iliac artery showed signs of infection. After systemic heparinisation with 5000 IU heparin, the infrarenal aorta and iliac arteries were clamped and the affected segment was resected along with all implanted material. After thorough cleansing of the surrounding tissue with saline solution, an interposition vein graft was constructed restoring patency of the left iliac segment (Fig. 4).

The post-operative recovery was uncomplicated and the patient was discharged 15 days after surgery with decreased inflammatory markers ($8.0\times10^3/\mu L$ leukocytes and a CRP of 52.4mg/L). The patient remained on antibiotic therapy with ciprofloxacin (750mg; q12hr) for 14 days after surgery. Microbiology culture of the stent was negative, probably because of the ongoing treatment with intravenous antibiotics.

The patient remains asymptomatic after 6 months, with no complaints of claudication, leg pain, or skin lesions, and with no oedema of the right leg. There is no evidence of recurrent infection.

DISCUSSION

Vascular stent infection can be associated with significant morbidity (17.2—75.3%),[2] and its definitive treatment may require a complex invasive surgical procedure, particularly in intra-abdominal and intra-thoracic positions which are associated with a mortality rate of 20—50%.[3]

In 2013 Bosman et al.[2] reviewed all reports of intravascular bare metal stent infections, and identified 77 cases (29 coronary and 48 non-coronary). Common iliac artery stent infections represented 23.4% of the overall described cases. In the non-coronary group, the iliac segment was the territory most frequently involved in stent infection, followed by the femoral artery and the renal artery.[2]

Most reported cases developed early, within 2 weeks of stent implantation.[3,4] A break in sterile technique is suggested as the most likely cause in these early stent infections. This was also the case in the patient described here, in whom the temporal association between implant and onset of symptoms suggests procedural contamination as the aetiology. In 25% of cases the infection occurs at a later stage, months to years after stent placement.[3] The most prevalent agent isolated is *Staphylococcus aureus*, responsible for 83% of stent infections.[3,5]

Clinical presentation of a stent infection may include progressive arterial destruction with disruption and haemorrhage, pseudoaneurysm formation, septic embolisation, and stent thrombosis.[2,4—7] Pseudoaneurysm arterial degeneration is the most common radiological sign, found in 77.9% of stent infection cases.[2] In the present case, the stent remained patent, but there were signs of septic

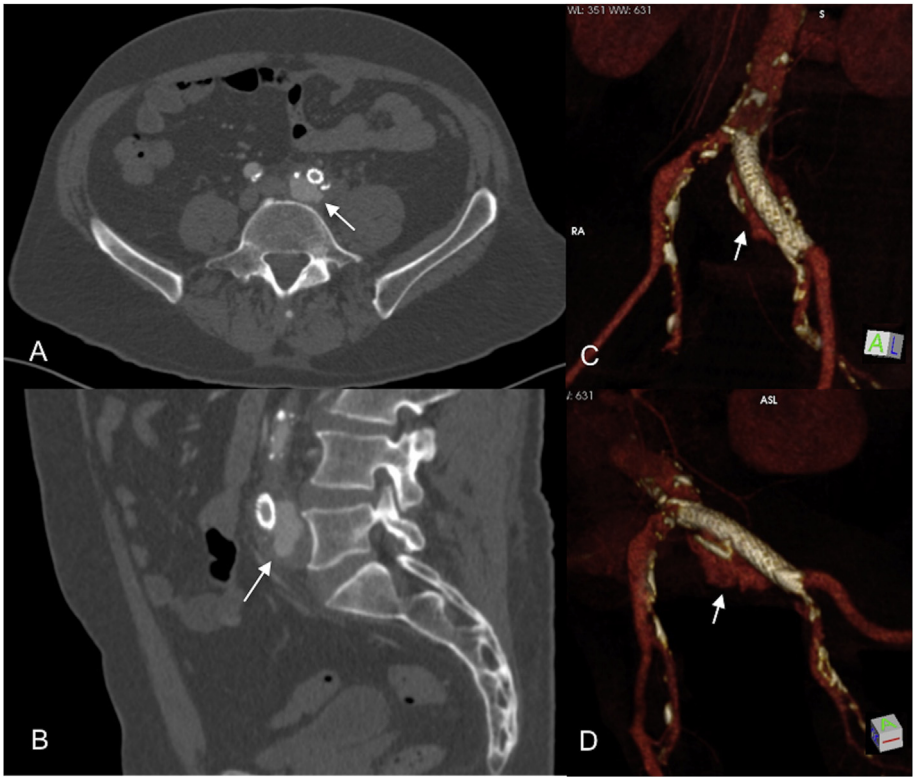

Figure 2. Computed tomography angiography showing the left common iliac artery pseudoaneurysm related to the stent implantation site (white arrow); axial and sagittal views (A, B); three dimensional volume rendered reconstruction of the computed tomography angiogram (C, D).

embolisation in the ipsilateral lower limb and an arterial pseudoaneurysm involving the common iliac stent was present.

The rarity and non-specific clinical manifestations mean that there is a delay in the diagnosis in 50.7% of cases.[2] A high level of suspicion is mandatory for a timely diagnosis. Stent infection should be considered in the differential diagnosis of bacteraemia and fever in a patient with a history of stent implantation, especially if within 2—4 weeks of the procedure.[2]

Figure 3. Right superficial femoral vein harvest.

A review of reported cases conducted by Hogg et al.[6] identified risk factors for stent infection. In the present case there were several potential risk factors: it followed a second intervention, prophylactic antibiotics were not administered, and a drug coated balloon was used prior to the second stent implantation. Another potential risk factor could be that the procedure was performed in the angiography suite, which is a less aseptic environment compared with the operating theatre.

Neointimal formation and the incorporation of the stent in the arterial wall is reported as a protective measure against stent infection.[4,7] Inhibition of neointimal hyperplasia, promoted by drug-eluting stents, is underlined as a risk factor for early infections.[2] In the case described here, the use of a drug coated balloon before implantation of the second stent could have played a role in the onset of the infection.

Open surgical repair is the preferred treatment option whenever possible. Other options include conservative therapy with antibiotics or an endovascular approach, both associated with considerable mortality rates (50—75%).[2,5] The definitive treatment may include stent removal and vascular reconstruction. The use of autologous superficial femoral vein for in situ arterial reconstruction is a valid option with recognised advantages especially in an infected field.[5,8] The femoral vein is a large calibre autogenous conduit with approximately the same diameter as the iliac artery and is robust, resisting recurrent infection better than prosthetic conduits or thin walled veins such as the

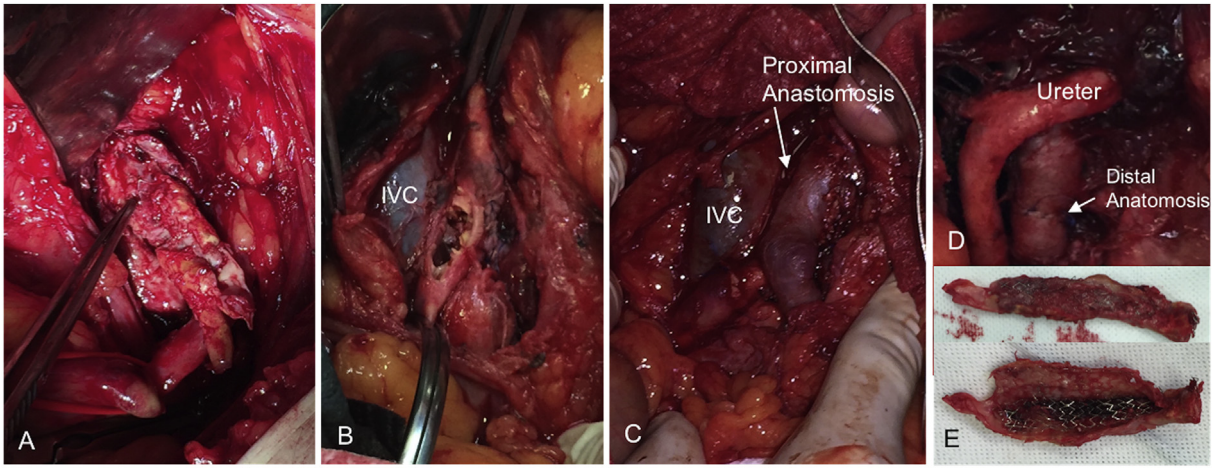

Figure 4. Surgery procedure images. (A) Resection of the segment of common iliac artery with the implanted stents at the aortic bifurcation (stent struts visible). (B) Aortic bifurcation after excision of the affected iliac segment (IVC, inferior vena cava). (C) Proximal anastomosis of the interposition superficial femoral vein conduit. (D) Distal anastomosis. (E) Iliac arterial wall and stents explanted.

saphenous vein. Superficial vein harvest however, adds complexity and time to the procedure, and may be associated with venous morbidity symptoms, such as leg oedema in less than one third of the cases (11—15.2%).[9,10] Allografts have also been used successfully as conduits, but can have limited availability and cost, and the durability seems inferior to autologous vein.[9] As an alternative, ligation and extra-anatomical femoro-femoral bypass has been described, but this has poor long-term results,[9] with the disadvantages of the risk of stump blowout and lower patency compared with in situ reconstruction.

CONCLUSION

Bare metal stent infection is a rare but serious condition that can result in significant morbidity. Resection of infected tissue and implanted material, and in situ reconstruction using autologous superficial femoral vein provides an effective and durable treatment. Identification of risk factors such as re-intervention and use of local antimitotic drugs, use of antibiotic prophylaxis, and strict compliance with sterility protocols may minimise the risk of stent infection.

CONFLICT OF INTEREST

None.

FUNDING

None.

REFERENCES

1 Green BR, McCaslin J, Wyatt MG. Infection of a nitinol popliteal arterial stent. *Eur J Vasc Endovasc Surg Extra* 2013;**26**:e41—2.
2 Bosman WMPF, Borger van der Burg BLS, Schuttevaer HM, Thoma S, Joosten HP. Infections of intravascular bare metal stents: a case report and review of literature. *Eur J Vasc Endovasc Surg* 2014;**47**:87—99.
3 Sternbergh WC, Money SR. Iliac artery stent infection treated with superficial femoral vein. *J Vasc Surg* 2005;**41**:348.
4 Kondo Y, Muto A, Ando M, Nishibe T. Late infected pseudoaneurysm formation after uneventful iliac stent placement. *Ann Vasc Surg* 2007;**21**:222—4.
5 Wissangi T, Fouard O, Herman D, Hermans P, Vindevogel C. Management and prevention of percutaneous iliac stent infection: a case report. *Ann Vasc Surg* 2016;**21**. 131.e1-5.
6 Hogg ME, Peterson BG, Pearce WH, Morasch MD, Kibbe MR. Bare metal stent infections: case report and review of the literature. *J Vasc Surg* 2007;**46**:813—20.
7 Paget DS, Bukhari RH, Lohr JM, Roberts WH. Infectibility of endovascular stents following antibiotic prophylaxis or after wall incorporation. *Am J Surg* 1999;**178**:151—4.
8 Daenens K, Fourneau I, Nevelsteen A. Ten-year experience in autologous reconstruction with the femoral vein in the treatment of aortofemoral prosthetic infection. *Eur J Vasc Endovasc Surg* 2003;**25**:240—5.
9 Heinola I, Kantonen I, Jaroma M, Alback A, Vikatmaa P, Aho P, et al. Treatment of aortic prosthesis infections by graft removal and in situ replacement with autologous femoral veins and fascial strengthening. *Eur J Vasc Endovasc Surg* 2016;**51**:232—9.
10 Modrall JG, Hocking JA, Timaran CH, Rosero EB, Arko FR, Valentine RJ, et al. Late incidence of chronic venous insufficiency after deep vein harvest. *J Vasc Surg* 2007;**46**:520—5.