CASE REPORT

Late onset iatrogenic limb ischaemia after deployment of an Angio-Seal vascular closure device

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SUMMARY

It is common practice to deploy a vascular closure device for access site closure after percutaneous angiography or cardiovascular interventions for immediate haemostasis and to facilitate early discharge. We encountered two octogenarian women who underwent and had subsequent vascular access site closure with Angio-Seal (St Jude) and who later presented with limb ischaemia needing surgical revascularisation.

Our patients had undergone uneventful deployment of the Angio-Seal vascular closure device (VCD) at the right common femoral artery (CFA) access site with successful haemostasis. About 3 weeks later they presented with features of limb ischaemia needing further diagnostic work-up including repeat angiography, which revealed subtotal occlusion of right common femoral artery at the level of prior access and Angio-Seal deployment site. Both the patients underwent successful surgical repair with restoration of distal flow and resolution of symptoms. These cases illustrate the late presentation of VCD-related complications with limb ischaemia, needing surgical revascularisation.

BACKGROUND

Early vascular complications are well known to occur with the use of vascular closure devices (VCDs), but late onset ischaemia described as vascular occlusion after 1 week of VCD deployment is not well described.^{1 2} Vascular ischaemic complications related to VCD use are complex and often require surgical correction.³ We report two cases of late onset limb ischaemia with thrombotic occlusion of common femoral artery (CFA) requiring surgical intervention 3 weeks after deployment of Angio-Seal VCD.

CASE PRESENTATION**Case 1**

An 83-year-old woman, a former smoker, with hypertension, peripheral arterial disease (PAD), hepatitis C and asthma, underwent cardiac catheterisation for symptoms of chest pain of 6 weeks duration and a positive stress test. Access was established using a modified Seldinger technique, and a 7-French sheath was placed in the right CFA. The patient had diffuse multivessel calcific coronary artery disease and was referred for coronary artery bypass graft surgery (CABG). An Angio-Seal VCD was deployed at the right CFA after iliofemoral angiography (figure 1) for haemostasis, but was noted to have some persistent oozing around the access site post deployment, which resolved with manual pressure. The patient underwent

Figure 1 Right iliofemoral angiography showing common femoral artery prior to deployment of an Angio-Seal vascular closure device.

CABG and was discharged, in stable condition, to rehabilitate. About 3 weeks later she developed pain and numbness of the right great and second toes with diminished pulse in the extremity and was referred to vascular clinic; she was noted to have developed gangrene in her right toe and underwent peripheral angiography with repeat right CFA access. She was diagnosed to have subtotal occlusion at the prior right CFA access and VCD deployment site (figure 2), and obstructive peripheral artery disease (PAD) in the distal vessel as well. The patient underwent right CFA endarterectomy with bovine patch angioplasty and

Figure 2 Digital subtraction angiography showing near-total occlusion of right common femoral artery at site of Angio-Seal deployment.

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subsequent atherectomy, and angioplasty of right anterior tibial and peroneal artery. She clinically improved and was later discharged home.

Case 2

An 82-year-old woman with coronary artery disease, diabetes mellitus, chronic kidney disease PAD with intermittent claudication symptoms (left>right), underwent a diagnostic peripheral angiogram via right CFA access using a 5-French size sheath, which revealed bilateral severe superficial femoral artery (SFA) disease. The patient underwent angioplasty of the left SFA and the access site was closed with an Angio-Seal VCD. She was due for staged angioplasty of the right SFA in a few weeks. While on dual antiplatelet therapy, the patient experienced worsening claudication symptoms on the right lower extremity. She presented for staged intervention of the right SFA with persistent claudication. Angiography was obtained via left CFA access for staged intervention at the right SFA, and it revealed 100% occlusion of the right CFA at the site of prior access and VCD deployment. The patient underwent right CFA surgical endarterectomy with a bovine patch angioplasty.

OUTCOME AND FOLLOW-UP

Case 1

Post procedure, the patient was able to ambulate with resolution of symptoms, however, she needed chronic wound care to the right great toe with hyperbaric therapy. She remains under follow-up with vascular clinic.

Case 2

The post procedure course was complicated by lower gastrointestinal bleeding, which was managed conservatively. The patient did have some persistence of claudication symptoms prior to discharge due to extensive PAD. She is under follow-up.

DISCUSSION

Utilisation of VCD in percutaneous coronary intervention (PCI) is more prevalent due to benefits of immediate arteriotomy site haemostasis, early patient mobilisation and hospital discharge, but with similar rates of vascular complication compared to manual compression.⁴ Increased incidence of vascular complications is probably due to increased use of VCDs in modern endovascular practices.³ The Angio-Seal femoral artery closure device is a bioabsorbable, sheath-delivered device that seals the puncture defect with a small collagen plug.⁵ It is our intent to report late onset limb ischaemia with CFA stenosis associated with Angio-Seal VCDs and describe the possible mechanisms. On review of the literature and of our cases in detail, we notice that claudication is frequent and occurs in patients with calcific vessels, and most cases need surgical repair. It is to be recognised that late presentation of vascular stenosis after deployment of an Angio-Seal VCD is probably due to collagen inadvertently

introduced intravascularly, owing either to improper technique or associated calcification of the vessel, preventing proper approximation of anchor and collagen during deployment, which occurs in 1–3% of cases. Use of VCD in calcified vessels, at the location level of the external iliac artery or below the femoral bifurcation and in small size vessels (<5 mm in diameter) is discouraged.^{6 7} Iatrogenic CFA stenosis has been treated in case reports with plain balloon angioplasty, nitinol covered stents or surgical intervention. In our cases, surgical endarterectomies with bovine patch angioplasty were performed with good outcomes. Our cases revealed that ischaemic complications related to VCD can present late and should be looked for during follow-up.

Learning points

- ▶ Late onset ischaemic complications related to Angio-Seal vascular closure devices are possible and to be anticipated during follow-up.
- ▶ Patients with peripheral arterial disease and calcific vascular anatomy may be prone to this delayed vascular complication.
- ▶ Early imaging and angiographic analysis is encouraged.

Contributors RKK and NK cared for the patients and drafted the manuscript. NB reviewed the details and finalised the draft.

Competing interests None declared.

Patient consent Obtained.

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REFERENCES

- 1 Wille J, Vos JA, Overtom TT, *et al.* Acute leg ischemia: the dark side of a percutaneous femoral artery closure device. *Ann Vasc Surg* 2006;20:278–81.
- 2 Thalhammer C, Joerg GR, Roffi M, *et al.* Endovascular treatment of Angio-Seal-related limb ischemia—primary results and long-term follow-up. *Catheter Cardiovasc Interv* 2010;75:823–7.
- 3 Klockner J, Gratl A, Chemelli A, *et al.* Influence of use of a vascular closure device on incidence and surgical management of access site complications after percutaneous interventions. *Eur J Vasc Endovasc Surg* 2011;42:230–5.
- 4 Nikolsky E, Mehran R, Halkin A, *et al.* Vascular complications associated with arteriotomy closure devices in patients undergoing percutaneous coronary procedures: a meta-analysis. *J Am Coll Cardiol* 2004;44:1200–9.
- 5 Eggebrecht H, Haude M, Woertgen U, *et al.* Systematic use of a collagen-based vascular closure device immediately after cardiac catheterization procedures in 1,317 consecutive patients. *Catheter Cardiovasc Interv* 2002;57:486–95.
- 6 Kadner A, Schmidli J, Schwegler I, *et al.* Complications associated with the arterial puncture closure device—Angio-Seal. *Vasc Endovascular Surg* 2008;42:225–7.
- 7 Dregelid E, Jensen G, Daryapeyma A. Complications associated with the Angio-Seal arterial puncture closing device: intra-arterial deployment and occlusion by dissected plaque. *J Vasc Surg* 2006;44:1357–9.

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