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UNINTENDED DISTAL EMBOLISATION OF A DRUG-COATED BALLOON DURING PERCUTANEOUS CORONARY INTERVENTION: WHEN IS LEAVING THE DEVICE IN SITU FEASIBLE?

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ABSTRACT

Background: Balloon angioplasty can lead to multiple complications, such as myocardial perforation and dissection of coronary arteries. Device dislodgment during percutaneous coronary intervention (PCI) is a rare but potentially life-threatening complication.

Case description: We report on a 67-year-old woman presenting with acute coronary syndrome due to in-stent restenosis of the left circumflex artery, treated with a drug-coated balloon (DCB) following lesion preparation. During DCB retrieval resistance was encountered, and angiography revealed separation of the balloon from its shaft with distal embolisation. Despite this, thrombolysis in myocardial infarction (TIMI) flow grade 3 was preserved. After multidisciplinary discussion, conservative management was chosen due to the distal location of the embolised device and risks associated with retrieval. Final angiography showed no procedural complication, and at 12-month follow-up, the patient remained asymptomatic without ischaemic or device-related events.

Conclusion: This example shows that in certain patients with intact coronary flow and no procedural complications, conservative therapy of distal DCB embolisation might be a safe and feasible strategy.

KEYWORDS

Drug-coated balloon, percutaneous coronary intervention, balloon dislodgment, complication

LEARNING POINTS

- This case highlights that, in selected patients, leaving an embolised device in situ may be a safe and feasible strategy when distal flow is preserved and procedure risks outweigh benefits of retrieval.

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INTRODUCTION

The utilisation of drug-coated balloons (DCBs) is increasingly prevalent in the treatment of coronary artery diseases, particularly in cases with in-stent restenosis (ISR)[1]. Balloon angioplasty may result in various complications, including myocardial perforation and dissection of coronary arteries, which are potentially related to considerable morbidity and mortality. We report a rare case of unintended distal embolisation of a DCB during percutaneous coronary intervention (PCI) and discuss the feasibility of conservative management.

CASE DESCRIPTION

A 67-year-old woman presented with acute chest pain and dyspnoea. The patient had coronary artery disease with a previous PCI to the left circumflex artery (LCX) using a drug-eluting stent. Upon admission, the electrocardiogram showed sinus rhythm with T-wave inversion in the lateral leads. Troponin I was elevated at 0.9 ng/ml (normal range: 0.0–0.056). A transthoracic echocardiogram revealed severe left ventricular systolic dysfunction (ejection fraction 25%). Diagnostic coronary angiography was conducted by the right radial route, revealing 80% ISR in the mid-segment of the LCX *(Fig. 1)*. The decision was made to proceed with PCI of LCX.

The left main coronary artery was engaged using a 6F extra backup (EBU 3.5) guiding catheter. The LCX was wired with a balanced middle weight guide wire. A 3.5 × 10 mm scoring balloon was used after successive pre-dilation with non-compliant balloons (3.0 × 15 mm, 3.5 × 15 mm and 4.0 × 15 mm) for lesion preparation. A DCB was then advanced and inflated. During the retrieval of the DCB resistance was met, and angiographic evaluation indicated that the balloon had detached from its shaft *(Fig. 2)* and travelled into the distal coronary arteries *(Fig. 3)*. Despite the embolised device, thrombolysis in myocardial infarction (TIMI) flow grade 3 was maintained. A heart team discussion was conducted to discuss the therapeutic options, including percutaneous retrieval, surgical removal and conservative management. Given preserved TIMI 3 flow, distal location in a small-calibre vessel and the high risk of retrieval, a careful decision was made to leave the device in place. Final angiography showed no signs of arterial perforation or flow restriction, and an ideal outcome at the target lesion with preserved TIMI 3 flow. The patient was discharged on dual antiplatelet treatment (DAPT), including aspirin 81 mg daily and clopidogrel 75 mg daily. Given a low bleeding risk (using the PRECISE-DAPT score) and high ischaemia risk, prolonged DAPT beyond 12 months was considered.

At the 12-month follow-up the patient was asymptomatic, exhibiting no signs of recurrent ischaemia, aggravation of heart failure or complications due to the device.

DISCUSSION

Device-related complications during PCI are rare but can be fatal or affect the procedure's success and the patient's health. Among these, device dislodgement and distal embolisation are infrequent but difficult situations, especially when dealing with complicated lesions such

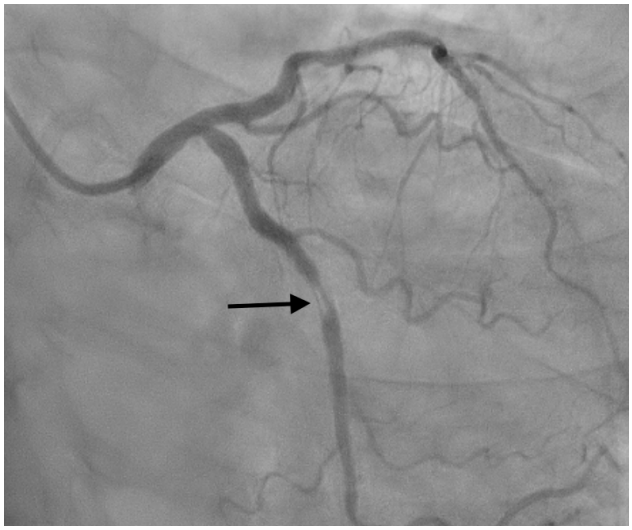


Figure 1. *Coronary angiography showing the in-stent restenosis 'arrowhead' in the left circumflex artery.*

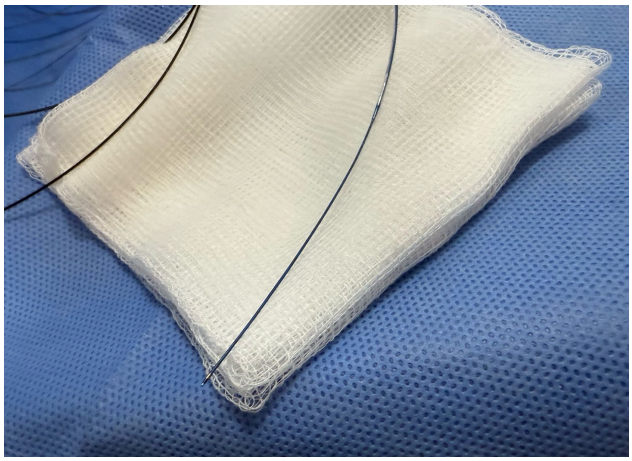


Figure 2. *The retracted catheter with the balloon detached from its shaft.*

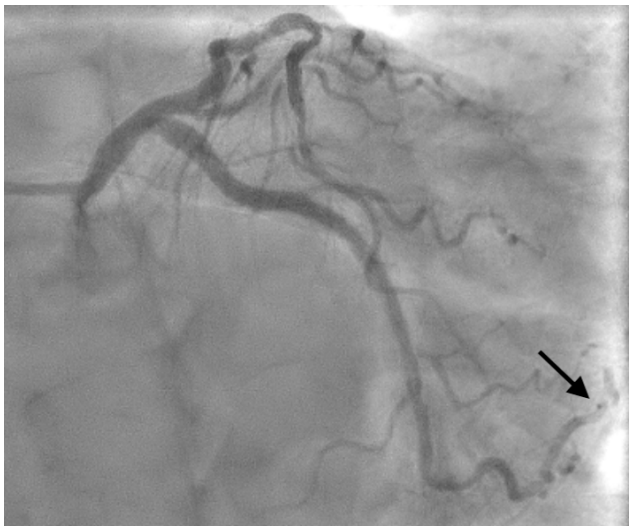


Figure 3. *Coronary angiography showing the final picture with the dislodged balloon 'arrowhead' in the distal segment of the left circumflex artery.*

as ISR. This case illustrates an atypical complication characterised by inadvertent distal embolisation of a DCB and underscores that conservative management with the device remaining in situ may be a secure and viable approach in meticulously chosen individuals.

Historically, contemporary practice has seen an incidence of less than 1% for the loss of guidewires, stents and balloon pieces during PCI[2,3]. Better device design and operator experience have made it far less likely to happen. However, convoluted anatomy, severely calcified lesions, vigorous lesion preparation and frequent device manipulation are still known to be risk factors[4]. In this case, many high-pressure inflations of non-compliant and scoring balloons in the setting of ISR likely enhanced friction and mechanical stress, predisposing to balloon shaft separation.

Management of intracoronary foreign body embolisation is not uniform and should be tailored to the anatomy, course of action and clinical scenario of each patient. Percutaneous retrieval techniques including snare devices and small balloon trapping have been described with varying success. These techniques, however, are technically challenging especially in distal arteries, and carry the risks of arterial dissection, perforation or further embolisation. Surgical retrieval is still a last choice, usually only used when there are big proximal arteries or problems with blood flow[5].

This case supports a conservative approach in carefully selected patients, particularly when the embolised DCB is located distally, TIMI 3 flow is preserved, there are no angiographic complications, and retrieval carries high procedural risk. Significantly, the favourable clinical trajectory noted during the 12-month follow-up corroborates the safety of this methodology in carefully chosen patients.

The biological behaviour of maintained intracoronary devices is unknown; however, endothelialisation over time may decrease the thrombogenic risk[6], although in general, extended DAPT is advised to lower the risk of thrombosis. The decision to continue DAPT beyond 12 months was also based on a low bleeding risk profile. The use of DCBs to treat ISR is growing because they can deliver antiproliferative medicines without leaving a permanent scaffold[7]. Although difficulties with DCBs are rare, this case highlights the importance of cautious manipulation of the device, especially during retraction following high-pressure inflations.

The case contributes to the scarce literature on DCB embolisation and supports several crucial treatment hypotheses. First, not all device embolisation requires retrieval; second, the preservation of distal flow and prevention of ischaemia are important considerations in adopting a conservative technique; and third, multidisciplinary decision-making is vital in complex procedural challenges. Additional research and registry data are necessary to more precisely delineate appropriate care options and long-term outcomes in these uncommon situations.

CONCLUSION

This case demonstrates that conservative management of distal DCB embolisation may be a safe and feasible option in carefully selected patients with preserved coronary flow and no procedural complication. This case highlights the importance of the heart team concept and its contribution to raising the standards of care in patients with cardiovascular diseases. Further studies and registry data are needed to better define optimal management strategies and long-term outcomes.

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