Stent dislodgement in left anterior descending coronary artery and successful deployment with two parallel wires and a small balloon

Przemieszczenie stentu w gałęzi przedniej zstępującej lewej tętnicy wieńcowej oraz jego skuteczna repozycja z użyciem dwóch prowadników i małego balonu

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Abstract

Coronary artery stent dislodgement during angioplasty is a rare complication. Stent dislodgement was more frequent in the past when stents were manually crimped onto the balloon. Newer and improved balloon-mounted stents with better radio-opacity have reduced the incidence of stent dislodgement but do not completely eliminate it. We report a case of balloon-mounted stent dislodgement in the proximal left anterior descending (LAD) coronary artery prior to deployment. This patient however was successfully treated with re-wiring of the artery with two parallel wires and the stent's reposition prior to deployment with the help of a small balloon.

Key words: stents, angioplasty, coronary artery disease, dislodgement

Kardiol Pol 2009; 67: 1040-1042

Introduction

The use of coronary stents during percutaneous coronary intervention is now increasingly common. Stent embolisation into the systemic or coronary circulation prior to deployment is a rare occurrence but is a recognised complication of coronary stenting, which poses a serious risk to the patient [1-2]. Other potential fatal consequences of intra-coronary embolisation of a balloon-mounted stent include acute coronary thrombosis and subsequent myocardial infarction [3-4]. In the past, manual crimping of the stent was associated with a significant risk of stent disengagement and embolisation [5]. Although newer stents do not require manual crimping, the problem of stent disengagement prior to deployment has not been completely eliminated.

Many of the newer stents are poorly visible on fluoroscopy prior to or after deployment, adding additional complexity to percutaneous coronary intervention. We report a case of a balloon-mounted stent that peeled off from the balloon prior to deployment in the left anterior descending (LAD) coronary artery due to a heavily calcified vessel. The dislodged stent was successfully manoeuvred and deployed without the need for bypass surgery. This report discusses the mechanisms and risk factors associated with this precarious complication.

Case report

An 81-year-old Chinese male was electively admitted for staged percutaneous coronary intervention to the left anterior descending branch of the coronary artery (3.0 mm calibre). His coronary risk factors include type 2 diabetes mellitus and hypertension. He was not a smoker. His initial coronary angiogram showed severe right coronary artery (RCA) and subtotal LAD stenosis. The RCA was stented ad hoc and the LAD lesion was rescheduled for staged stenting. The heavily calcified lesion was located in the proximal LAD and had a diameter stenosis of 99% (Figure 1). After initial predilatation with a 2.0 × 15 mm Elect

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balloon to 10 atm, the lesion was further dilated with a larger balloon (Elect 2.5 × 20 mm) for three inflations. A balloon expandable stent, Coroflex Please (B. Braun), 3.0 × 25 mm in length, was provisionally placed at the site of the lesion to reduce the risk of restenosis. There was difficulty in advancing the stent through the tightest lesion site as the guiding catheter was not able to provide adequate support. The guiding catheter was changed for another one with a better support system.

However, when withdrawing the initial guide catheter, the stent was dislodged from the expandable balloon without our notice. The dislodged stent was later seen at the lesion when evaluated with cinegram after the guide catheter was changed. The patient was asymptomatic and haemodynamically stable. He was heparinised and the cardiothoracic surgeon was consulted in view of possible stent retrieval by coronary bypass surgery. However, due to the high surgical risk, we decided to try percutaneous retrieval after discussion with the patient and family. An attempt to remove the stent by snaring however failed. Subsequently, two parallel wires were passed into the LAD with one utilised as a buddy wire and another aimed into the stent lumen and successfully passed into the stent lumen. A small, 1.25 × 15 mm balloon was inflated proximal to the stent and was successfully repositioned at the desirable location. The stent was deployed without having to subject the patient to coronary artery bypass surgery. The final result was good angiographically (Figures 2 and 3) with TIMI 3 flow. The patient was discharged well from our ward two days later without further complications.

Discussion

The management of coronary artery disease was revolutionised with the invention of the coronary artery stent. The use of coronary artery stents during percutaneous coronary intervention is now increasingly common. The earlier bare metal stent was found to be associated with higher risk of late stent loss as a result of in-stent restenosis. With the advancement of drug-eluting stents, the risk of in-stent restenosis was reduced to less than 10% compared to bare metal stents [6, 7]. This has led to the exponentially increased use of balloon expandable stents. Balloon expandable coronary stents have remained a valuable contribution in treating coronary artery disease and have remained the choice for most practising interventional cardiologists. The use of coronary artery stents for lesions in the proximal LAD is a routine procedure. We also decided to use a stent to reduce the risk of restenosis in our patient. This type of stent is advanced across the lesion without a protective sheath. After placing the stent in the correct position, the balloon is inflated so that the stent is expanded to compress the intima and media flap of the coronary artery, thereby supporting the tubular luminal shape of the coronary

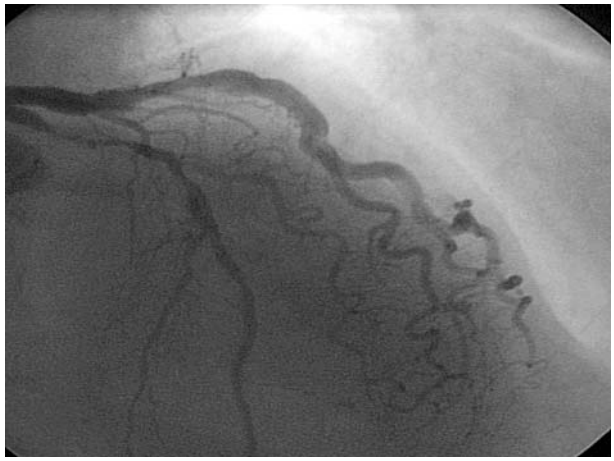

Figure 1. Angiogram showing the calcified stenotic lesion at the proximal left anterior descending artery

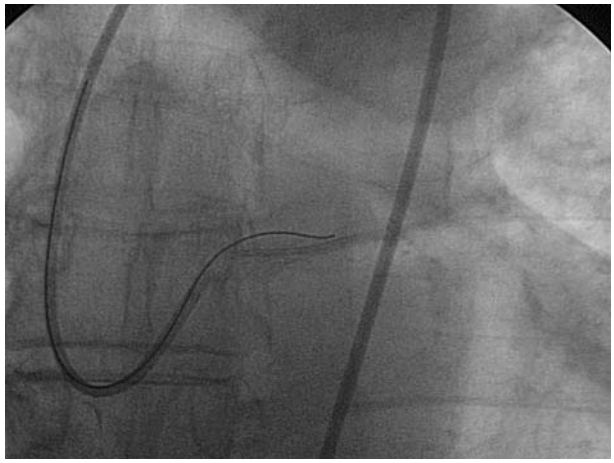

Figure 2. The stent was dislodged in the left anterior descending artery

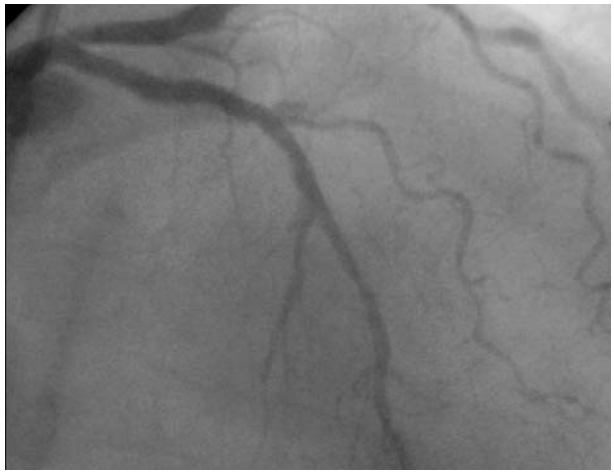

Figure 3. Angiogram showing successful deployment of the stent to the size of the native vessel with good result

artery. However, a number of papers have reported several severe complications from balloon expandable stents. Stent embolisation into the systemic or coronary circulation before deployment is a rare but recognised complication of modern coronary stenting, with attendant serious risk for the patient.

The reported incidence of stent dislodgement varies between 1.4 and 8% [4, 8-9]. Stent dislodgement may be explained by different mechanisms. Firstly, a stent can dislodge by being stripped off the balloon while crossing the tightest coronary artery; or, secondly, it can get partially stuck within the lesion and become separated from the balloon when it is withdrawn; and thirdly, when withdrawing a deformed stent, a stent tine may catch on the guide tip, leading to the stent being stripped from the balloon.

The risk factors of stent dislodgement are related to the patient, equipment or the operator. Arterial tortuosity and calcification may cause difficulty not only in delivering a stent to the lesion but also in crossing it in the presence of calcification. Calcified spicules may also cause deformation of the stent, leading to stent dislodgement through any of the three aforementioned mechanisms. The type of equipment used may cause disadvantages such as a poor guide support, which decreases the stent's deliverability to a lesion. A pre-mounted stent however reduces stent loss when compared to the previous hand--mounted stent. Operator's experience and strategy are also important factors. In our patient, the complication was related to the site of stent deployment in which the artery was heavily calcified as well as the use of a poor guide support.

Various percutaneous retrieval techniques have been described to retrieve a dislodged stent from the coronary system. These include using a low profile angioplasty balloon catheter inflated distal to the undeployed stent [9-11], gooseneck snares [4, 9, 12], myocardial biopsy forceps [8, 13], multi-purpose baskets and the use of two twisted guide wires to entrap the dislodged stent [9, 14]. Other suboptimal options include compressing and crushing the dislodged stent against the vessel wall with another new stent and emergency coronary bypass surgery. The decision to retrieve or deploy or crush depends on the patient's clinical status, the operator's familiarity with equipment used, and location of the dislodged stent. In this patient, we decided on the percutaneous method as he was a high-risk patient for surgery. Failure to retrieve the dislodged stent can result in several complications including stent thrombosis, myocardial infarction, embolic stroke and death [4, 5]. The incidence of subacute stent thrombosis is estimated at about three to five percent of all elective cases and can be as high as 10 to 20% in emergency percutaneous coronary intervention [15].

This case report discussed a possible though uncommon unexpected complication of coronary artery stent placement – stent dislodgement. The approach of using two wires with one acting as a buddy wire to assist the other to cross the lumen of the stent has never been described and attempted before but may be helpful in cases such as this. In addition, better crimping of coronary stents and improved radio-opacity of the stents for easy visualisation may prevent the occurrence of this rare and potentially life-threatening complication. This patient was indeed fortunate to escape risky emergency coronary artery bypass surgery. He was discharged well two days later without in-hospital complications.

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