VIA MEDICA

CASE REPORT

Cardiology Journal
2007, Vol. 14, No. 1, pp. 87–90

ISSN 1507–4145

Successful coronary stent retrieval from the renal artery

Robert Juszkat[1], Mieczysław Dziarmaga[2], Bartosz Żabicki[1] and Bartosz Bychowiec[2]

[1]Department of Radiology, Poznań University of Medical Sciences, Poznań, Poland
[2]Interventional Cardiology Unit, Department of Cardiology,
Poznań University of Medical Sciences, Poznań, Poland

Abstract

Coronary stent loss and its migration is one of complications of percutaneous coronary interventions (PCI). We present a case of successful retrieval of a coronary stent which moved initially to the left renal artery. Subsequently the stent was lost again and migrated to the left deep femoral artery, while an attempt was made at its retrieval with a snare loop from the renal artery. Successful retrieval was finally performed through right femoral access by the so-called "cross-over" method. (Cardiol J 2007; 14: 87–90)

Key words: complication, percutaneous coronary intervention, stent loss, retrieval, snare loop

Introduction

Stent loss is a rare complication of percutaneous coronary intervention (PCI) [1, 2]. Although the number of PCI procedures has significantly increased over the years, the incidence of stent loss has decreased and remains at a rate of 0.2% [1]. The fall in the rate of this complication is due to the greater experience of interventional cardiologists and improvements in equipment, especially in the common use of premounted stents [1, 3].

Stent loss is more likely to occur in lesions which are significantly angulated proximally to the lesion and when calcification is present [1, 4]. Stent migration, when it does occur, may lead to severe complications, depending on its destination vessel. It may embolise in the coronary circulation and evoke cardiac infarction, which is an indication to emergency coronary artery bypass grafting (CABG). Alternatively, it may cause embolic cerebrovascular events, peripheral in-stent embolisation, bleeding or even death [1, 3, 5].

There are many methods of stent retrieval. The following devices can be used: a small-balloon catheter, a snare loop, the two-wire technique and instruments used only beyond the coronary circulation such as grasping forceps and basket retrieval devices [1, 6–11]. The snare loop currently appears to be the most efficient retrieval device [2, 12]. If stent retrieval is not possible, an attempt can always be made to crush it against the vascular wall with another stent so as to stabilise the first one [1, 6].

In our case the snare loop was the right tool for successful retrieval of a stent from the renal artery and subsequently from the deep femoral artery.

The authors of this case report have not found any previously published cases describing loss and migration of a stent to the renal artery during PCI.

Case history

A 63-year-old woman was admitted to our unit because of unstable angina. The first symptoms had occurred 7 days prior to hospitalisation but there

Address for correspondence: Bartosz Żabicki
Department of Radiology
Poznań University of Medical Sciences
Długa 1/2 61–848 Poznań, Poland
Tel: +48 61 8549 270, fax: +48 61 854 90 83
e-mail: bzabicki@tlen.pl
Received: 11.08.2006 Accepted: 23.11.2006

was no chest pain at the moment of admission to the hospital.

Resting ECG showed small R-wave progression in V1–V3 and T-inversion in lead III, but there was no increase in cardiac enzymes (troponin T, CK). Echocardiography was normal with an ejection fraction of 64%. The patient presented with the twin risk factors for coronary artery disease of hypercholesterolaemia and hypertension. An additional laboratory test revealed type 2 diabetes. Diagnostic coronary angiography performed by femoral approach showed significant stenosis (90%) in the right coronary artery (RCA). There was no other stenosis in the coronary artery tree.

The patient was referred for PCI. The target lesion was predilated with a Powersail balloon (3.5/ /18 mm) inflated at 10 atms. A drug-eluting stent, Taxus Liberte (3.5/20 mm), was delivered to the RCA. During the implantation the stent wedged and was then released to the aorta. Fluoroscopy excluded the possibility of dislocation of the stent to the arteries of the central nervous system and so the procedure was continued. After redilatation of the stenosis spiral dissection and artery occlusion occurred. The lesion was covered by two bare metal stents (Liberte 3.5/24 mm and 3.5/20 mm) inflated at 12–18 atms. The implanted stents were postdilated with a Powersail balloon 4.0/18 mm (12 atms) with a very good angiographic result (TIMI 3). ReoPro was administered. There was no periprocedural troponin T increase.

The next day, on the basis of fluoroscopy and digital subtractive angiography (DSA), the dislocated stent was localised in the bifurcation of the left renal artery (Fig. 1). Digital subtractive angiography of the abdominal aorta and renal artery was performed by femoral approach with the use of a "pigtail" Balton catheter (5 F) placed in the aorta up to L1/L2. Next, selective catheterisation of the left renal artery was carried out by means of a femoral-renal catheter (5 F, Balton). Digital subtractive angiography was performed in three different projections in order to localise the stent precisely and to determine the most efficient removal strategy. The stent was localised in the bifurcation of the renal artery in the long axis parallel to the vessel lumen. The larger part of the stent was distal to the point of bifurcation.

The evacuation of the stent was performed by snare loop Lasso 0.009 (Balt, Montmorency, France). Because of the difficulties caused by the peripheral position of the stent, the Lasso loop was anchored in its proximal part. The evacuation from the left renal artery was successful, although the Lasso loop slackened and another dislocation took place (Fig. 2). This time the stent moved to the deep

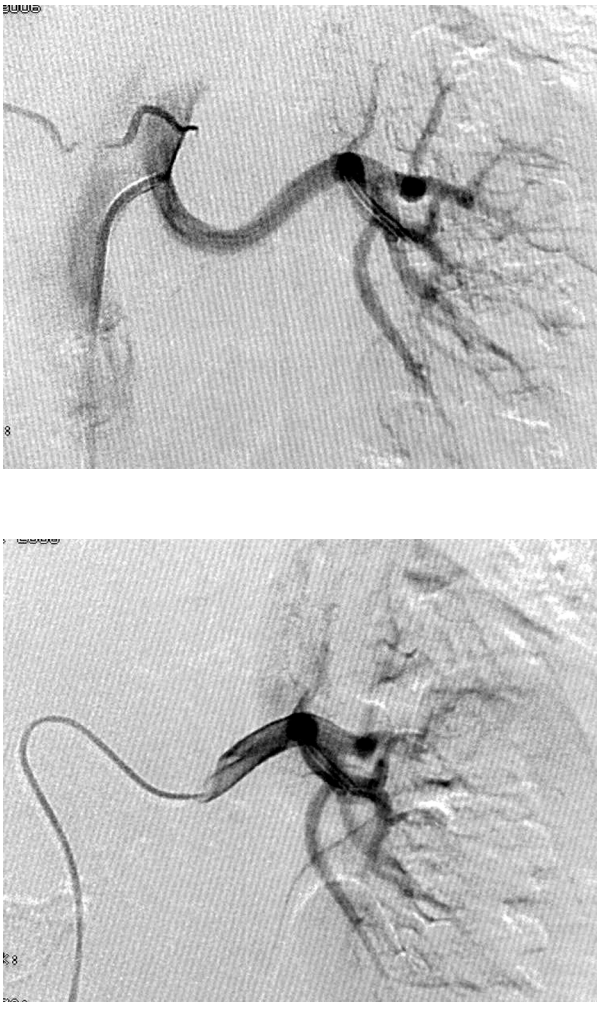

Figure 1. Digital subtractive angiography. Selective catheterisation of the left renal artery was performed. The stent is not deployed and is located in the dorsal branch of the renal artery beyond its bifurcation.

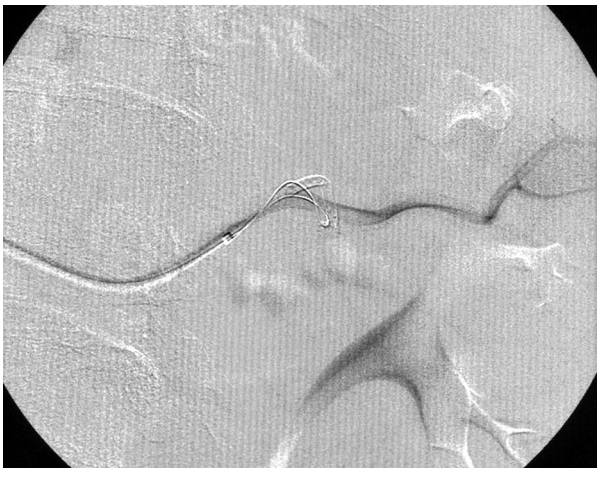

Figure 2. Stent retrieved with a snare loop.

Figure 3. Stent located in the bifurcation of the deep femoral artery.

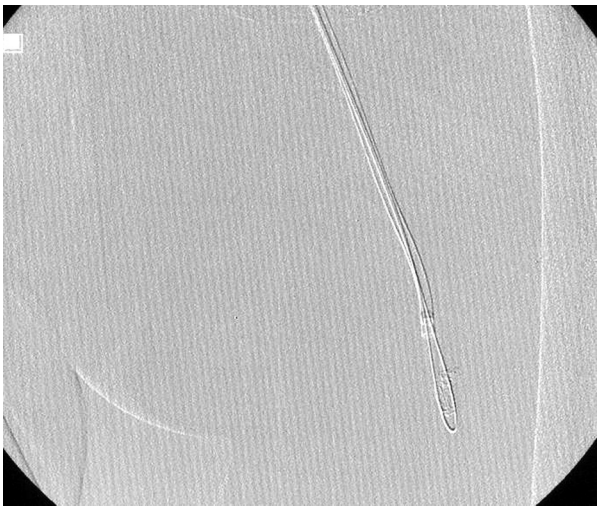

Figure 4. Stent retrieved with the two-wire technique.

femoral artery (Fig. 3). After exact location of the stent it was removed with the use of a catheter with two guide wires (Fig. 4). The procedure was performed through the right femoral access by the so-called "cross-over" technique.

The common iliac artery was cannulated with the use of a 5 F Sidewinder catheter (Balton, Poland) and hydrophilic wire 0.035 (Terumo, Japan). A 5F Balton straight catheter was then advanced over the wire into the deep femoral artery next to the lost stent. Successful retrieval of the coronary stent was finally performed by the two-wire technique. The Guidant Hi torque floppy wires 0.014', of length 300 cm, (Advanced Cardiovascular System Inc. CA, USA) were arranged into a basket retrieval device. No complications occurred during the procedure.

Diagnostic DSA of the renal arteries, abdominal aorta and the arteries of the lower limbs showed no iatrogenic damage to the vessels investigated. The patient was discharged on the third day in very good condition.

Discussion

As a result of the increasing experience of teams performing PCIs and the universal use of premounted stents, stent loss and its migration does not occur very often. However, anatomical circumstances, such as arterial tortuosity in the location proximal to the lesion and significant calcification of the lesion, increase the frequency of this complication [1, 13]. Stent loss is most likely to occur during the withdrawal of a balloon catheter with a stent to the guiding catheter, if the lesion could not be reached or if the stenosis could not be passed with the stent and balloon catheter [3, 5]. Furthermore, inadequate control of a therapeutic catheter with a guiding catheter or the guiding catheter falling out as a result of its shallow introduction to the coronary artery increase the risk rate of slip-off and loss of the stent. It is also reported that direct stenting without predilatation or introduction of one stent through the other stent are also risk factors for incorrect stenting and misplacement of the stent [5, 13]. No correlation is found between the complication rate and the location of the lesion in the right (RCA) or left coronary artery (LCA) or its precise location along the vessel [1, 3].

A case of stent migration to the renal artery has never before been published, and therefore it is hard to determine with confidence how serious the complications could be, if stent retrieval were abandoned, or if the retrieval were ineffective and only anticoagulants administered. It is known that stent embolisation during PCI mostly occurs within the coronary arteries. Hence in-stent coagulation and a high risk of cardiac infarction is definitely an indication to attempt stent retrieval. Similarly the coronary stent may migrate in the cerebral direction, where it could be a potential cause of ischaemic apoplexy and neurological deficiency symptoms. Peripheral stent embolisation is fairly safe. Stent withdrawal under the left subclavian artery level also seems to be free from further serious complications [13]. There are no clinical symptoms in most cases of peripheral embolisation, although intermittent claudication or acute ischaemia of the lower extremity may occur [4, 13]. In our case we attempted to retrieve the lost stent from the renal artery to avoid diminished renal perfusion, total embolisation

of the left renal artery trunk or possible damage to the vessel by a balloting stent and bleeding.

Of all the instruments in the introduction the snare loop is often the device of first choice (Gabelmann et al.: 77.7%) [6]. This intravascular device is relatively safe and easy to use. It has a low rate of complications and appears to be very effective [10, 12]. However, the choice of retrieval technique should be specific to each case and to the operator's experience. The decision must be taken in the light of the location of a stent, the type of stent and its deployment status. A snare loop appeared to be the best method of retrieval in our case, because our lost stent had not been deployed and did not ride on a guide wire. The use of low-profile balloon catheters is also very effective, especially in cases where a stent is still riding on a guide wire and is deployed enough to advance a small-balloon catheter through its lumen. The latter method was often chosen by Brilakis and Eggebrecht with a success rate of 50–70%. In comparison Brilakis succeeded with a snare loop in 100% and Eggebrecht in 25% only [1, 3]. The use of other devices such as the grasping forceps may be equally effective, but this can only be used outside coronary arteries and is linked with a higher risk of vessel damage.

In our case the snare loop loosened during withdrawal of the stent from the renal artery to the abdominal aorta. The stent was lost and migrated with the blood stream to the left deep femoral artery and was finally extracted using two 0.014 intermingling guide wires guided in one catheter. The attempt at further stent extraction from this artery could probably have been abandoned and conservative treatment applied. If in-stent embolisation of the deep femoral artery occurs, there are no symptoms or only insignificant symptoms of ischaemia. Yet there seemed to be no contraindications for an experienced team to attempt to perform a successful stent retrieval to minimise the possibility of any symptoms of ischemia.

If there is no way to retrieve a stent, it is always possible to try to reimplant it in a safer location or to stabilise it using another stent. Nowadays, with the dynamic development of intravascular procedures, stent loss occurs very rarely. Nevertheless every catheterisation laboratory should be equipped with a set of instruments for intravascular foreign body retrieval and interventional cardiologists or radiologists should be familiar with these retrieval techniques.

References

1. Brilakis ES, Best PJM, Elesber AA et al. Incidence, retrieval methods, and outcomes of stent loss during Percutaneus Coronary Intervention: A large single-center experience. Catheter Cardiovasc Interv, 2005; 65: 333–340.
2. Patel TM, Shah SC, Gupta AK, Ranjan A. Successful retrieval of transradially delivered unexpanded coronary stent from the left main coronary Artery. Indian Heart J, 2002; 54: 715–716.
3. Eggebrecht H, Haude M, von Birgelen C et al. Non--surgical retrieval of embolized coronary stents. Catheter Cardiovasc Interv, 2000; 51: 432–440.
4. Roffi M, Luscher TF, Sutsch G et al. Failure to retrieve undeployed paclitaxel-eluting coronary stents. Am J Cardiol, 2006; 97: 502–505.
5. Chu CS, Lee ST, Lee KT et al. Successful retrieval of dislodged paclitaxel-eluting stent with a nitinol loop snare: A case report. Kaohsiung J Med Sci, 2005; 21: 566–570.
6. Gabelmann A, Kramer S, Gorich J. Percutaneus retrieval of lost or misplaced intravascular objects. Am J Roentgenol, 2001; 176: 1509–1513.
7. Kim MH, Cha KS, Kim JS. Retrieval of dislodged and disfigured transradially delivered coronary stent: report on a case using forceps and antegrade brachial sheath insertion. Catheter Cardiovasc Interv, 2001; 52: 489–491.
8. Rozenman Y, Burstein M, Hasin Y, Gotsman MS. Retrieval of occluding unexpanded Palmaz-Schatz stent from a saphenous aorto-coronary vein graft. Cathet Cardiovasc Diagn, 1995; 34: 159–161.
9. Antonellis IP, Patsilnakos SP, Pamboukas CA et al. Successful withdrawal from the right coronary artery of an NIR stent dislodged from the balloon catheter. J Interv Cardiol, 1999; 3: 215–218.
10. Seong CK, Kim YJ, Chung JW et al. Tubular foreign body or stent: safe retrieval or repositioning using the coaxial snare technique. Korean J Radiol, 2002; 3: 30–37.
11. Madronero JL, Hein F, Bergbauer M. Removal of a ruptured, detached, and entrapped angioplasty balloon after coronary stenting. J Invasive Cardiol, 2000; 12: 102–104.
12. Koseoglu K, Parildar M, Oran I, Memis A. Retrieval of intravascular foreign bodies with goose neck snare. Eur J Radiol, 2004; 49: 281–285.
13. Drozd J, Zapolski T, Wójcik J. Usunięcie stentu z lewej komory serca po nieudanej implantacji do gałęzi międzykomorowej przedniej lewej tętnicy wieńcowej. Kardiol Pol, 2005, 62: 250–253.