Retrieval of dislodged stents from left main during percutaneous coronary intervention by trapping technique

Authors: Santosh Kumar Sinha, Mukesh Jitendra Jha, Divendu Khanra, Avinash Kumar Singh, Ramesh Thakur

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Retrieval of dislodged stents from left main during percutaneous coronary intervention by trapping technique

Stents retrieval by trapping technique

Santosh Kumar Sinha, Mukesh Jitendra Jha, Divendu Khanra, Avinash Kumar Singh, Ramesh Thakur
Department of Cardiology, LPS Institute of Cardiology, G.S.V.M. Medical College, Kanpur, India

Abstract
Dislodgement and embolisation of the new generation of drug eluting stents is a very rare but recognized and potentially serious complication of percutaneous coronary intervention (PCI). Various methods from including tangling wire, bioptome, and goose neck snare to surgical removal have been described. Here we report a case of successful retrieval of a deformed coronary stent from left main coronary artery by trapping technique.

Key words: coronary thrombosis, myocardial infarction, retrieval, stent dislodgement, embolization, sudden death

Address for correspondence: Dr Santosh Kumar Sinha, Department of Cardiology, LPS Institute of Cardiology, G.S.V.M. Medical College, G.T. Road, Kanpur, Uttar Pradesh 208002, India, e-mail: fionasan@rediffmail.com

Introduction
The use of stents during percutaneous coronary intervention is now a routine. Stent dislodgement and embolization into the systemic or coronary circulation before deployment is a rare but serious complication of coronary stenting. They were not rare when using first generation stents [1-3]. Consequences could be including coronary thrombosis, myocardial infarction, stroke, perforation and sudden death [5, 6]. In the past, manual crimping of stents was associated with a significantly increased risk of stent dislodgement and embolization. Although, these are no more used today but still it has not completely been eliminated in
today’s era especially when negotiating tortuous and/or calcified arteries and passage through a previous stent [3]. Furthermore, currently available stents are poorly visible on fluoroscopy before and after deployment, therefore, in case of embolization their retrieval becomes more difficult.

**Case report**

A 42-year-old man was admitted with low effort angina – CCS class III. Three years earlier, he had suffered an anterior wall myocardial infarction. His risk factors were chronic cigarette smoking and dyslipidemia. On examination, pulse rate was 74 beats/min and the arterial blood pressure was 134/88 mm Hg. Other system examinations were within normal limit. Pathological Q waves, T-wave inversion and poor R wave progression were present in leads V₂-V₆. An echocardiogram showed mild hypokinetia of LAD Tx with ejection fraction (EF) 52%. He was further subjected to tread mill test which was strongly positive for stress induced myocardial ischemia. Coronary angiogram revealed normal right coronary arteries and left circumflex coronary artery and chronic total occlusion of left anterior descending artery from ostia which was receiving grade II Grantham collateral from right coronary arteries (Fig. 1, 2A). It was decided to perform percutaneous coronary intervention for the total occlusion after proper consent. Both femoral arteries were punctured and 6 F Input sheath (Medtronic, USA) was put. Intravenous heparin (100 U/kg) was administered. Left main was hooked with 6 F Launcher® Extra Back Up (EBU) Coronary Guide Catheter (Medtronic, USA). 0.014” 190 cm Hi- Torque BMW (Abbott Vascular, USA) wire was parked in distal left circumflex artery. 0.014” 190 cm Fielder XT wire (Asahi Intec, Japan) through FineCross™ MG micro catheter (Terumo NJ,USA) was initially tried but it failed to cross the lesion. As Miracle 6, 9 and 12 (Asahi Intec, Japan) could not cross the lesion, wire was finally exchanged with 0.014” 190 cm Conquest Pro 12 (Asahi Intec, Japan) and lesion was successfully crossed with help of contra lateral injection from right coronary artery to confirm distal true lumen and it was parked distally (Fig. 2A-D). Wire was further exchanged with 0.014” 190 cm Hi-Torque BMW (Abbott Vascular, USA) and FineCross™ MG micro catheter was removed by Nanto’s technique. Lesion was repeatedly dilated with 1.25 × 6, 1.5 × 10, 2 × 10 and 2.5 ×10 Sprinter LegendRx Balloon (Medtronic, USA) (Fig. 3). Xience Prime 3.5 × 33 mm (Abbott Vascular, USA) was tried to place along the lesion but it was obstructed and further advancement was not possible probably due to heavy calcification along the lesion. Guiding catheter was firmly held and we gave some gentle jerks to the shaft of the stent but we could not deliver it across the lesion. We finally decided to withdraw the stent
into the guiding catheter but the distorted struts was stuck at the mouth of the guiding catheter and only stent balloon was visible when it came out of the hub, leaving stent with little part floating in the left main (Fig. 4A, B). We pushed the wire further in order to ensure the wire remained inside the stent. We tried to cross through the stent by small 1.25 × 6 mm balloon but it failed. We also tried to negotiate 0.014” 190 cm Hi-Torque BMW (Abbott Vascular, Santa Clara, USA) through the stent but it also failed. Finally 2 × 10 mm balloon was taken and parked parallel to the stent just inside the guiding tip (Fig. 4C). Balloon was inflated to 13 atmospheres and stent-balloon-guiding catheter – wire i.e assembly as a unit was pulled under fluoroscopy and stent was retrieved by trapping technique (Fig. 4D, 5A-D). We recrossed the total occlusion with a 0.014” 190 cm Hi-Torque BMW (Abbott Vascular, Santa Clara, USA) and then further dilated the lesion with a 2.75 × 10 mm cutting balloon. Two overlapping stents, proximally 3.5 × 23 mm and distally 3 × 19 mm were deployed successfully. Finally it achieved TIMI III flow (Fig. 6). Patient was discharged after third day and is under regular follow up since then.

Figure 1. Chronic total occlusion of left anterior descending (LAD) artery from ostia
Figure 2A-D. AP cranial view showing Conquest-Pro wire being advanced distally in LAD with help of contra lateral injection from right coronary artery.

Figure 3. Lesion being dilated with $1.5 \times 10$ Sprinter Legend$^{Rx}$ Balloon on BMW wire.
Figure 4A-D. Embolized stent hanging in left main (A, B); balloon placed parallel to stent in guiding (C); stent-balloon-guiding catheter – wire *i.e* all being pulled as a unit (D)

Figure 5 A-D. Partially visible distorted struts being stuck at the mouth of the guiding catheter (A, B); only stent being was over the wire (C, D)
Figure 6. AP caudal view showing TIMI III flow in left anterior descending (LAD) after deployment of two overlapping stent

Discussion

Stent embolisation is defined as the loss of the stent from the delivery system. It may occur proximal, in the lesion or distal to the lesion. If the guide is not co-axial and stability is not maintained, the guide may be displaced from the coronary ostium while the stent exits the guide and meets resistance in the coronary artery. The stent cannot be pushed further as there is no backup. While pushing the guiding or pulling the stent-balloon assembly; either of the manoeuvres may cause stent displacement and embolisation. This complication can be best avoided by choosing appropriate equipment: a low profile balloon-mounted stent that is well attached to the balloon, a co-axial guide catheter and possibly a stiffer wire that helps to straighten bends in the coronary artery and reduce resistance. However, the most important is to prevent this complication by taking utmost care while the manipulating as the stent exits or re-enters the guide.

Unnoticed proximal coronary lesions, calcification, tortuosity, improperly prepared bed, very long stent or acute angulation may cause the stent to be held up or displace while it traverses the artery towards the target lesion [7]. Although third gen. drug eluting stents are
factory-mounted systems, the risk of stent embolization has not been completely eliminated with incidence between 0.56 to 0.89% [8]. Stent dislodgement from the delivery system most often occurs when the stent balloon assembly is pulled back into the guiding catheter, or when the target lesion cannot be reached or cannot be passed due to unfavourable anatomy [9]. Intracoronary embolisation may cause dissection, thrombosis, perforation, arrhythmia, sudden death and systemic embolisation during rescue attempts. Nevertheless, every possible effort at stent retrieval should be tried. If the stent is dislodged in the coronary artery but is still on the guide wire, retrieval can often be achieved with a very low profile balloon inflated enough to secure the stent which can then be withdrawn. The stent can either be secured by the balloon being inflated within it or just beyond it and gradually brought inside the guiding and then withdrawn. If withdrawal of an embolised stent is not possible, the stent may be crushed by another stent while deployment. Other means of retrieving stents include commercially available goose-neck snares.

In our case heavy calcification was a hurdle in preparing the vessel for stenting. Despite graduated predilation with four balloons the vessel was still unprepared for stenting and instead of trying forceful placement we should have tried to predilate it with a bigger size balloon which we finally did with upsize cutting balloon. However, lesions that cannot be dilated with conventional balloon catheters due to lesion rigidity may also be dilated with Cutting Balloon Angioplasty (CBA) [10] and Rotational Atherectomy [11]. However, one should not try to stent the poorly prepared artery. Luckily, the stent was not dislodged around the coronary system and as soon as we observed the demounted stent at the guiding tip, we retrieved by simple trapping with help of a balloon. It was easy, convenient and cost saving as conventional snare was not used.

Conflict of interest(s)
None.

References


