Wire-Induced Stent Crumpling Remedied By Bail-Out Crush Stenting; A Case Report.

Azarisman SMS,[a] Rosli MA[b]

[a] Consultant Physician and Cardiologist, International Islamic University Malaysia
[b] Senior Consultant Cardiologist and Head, National Heart Institute Malaysia

ABSTRACT

We report a-56-year old army pensioner who presented initially to a peripheral hospital with acute ST-elevation inferior myocardial infarction thrombolysed with streptokinase. He was subsequently referred to the National Heart Institute (Institut Jantung Negara, Malaysia) for coronary revascularization. Coronary angiogram revealed an ectatic right coronary artery with discrete lesions at the proximal and distal segments stented with bare metal stents (BMS). Post dilatation shots revealed a wire-induced, distal dissection at the posterior left ventricular artery remedied by balloon angioplasty but resulting in balloon-induced crumpling of the distal BMS. We discuss the importance of sequential, distal-to-proximal coronary intervention, stent crumpling and remedial strategies.

KEYWORDS: Stents, angioplasty, complications

CASE REPORT

INTRODUCTION

Stents are a crucial and indispensable tool for all coronary interventionists and the delivery and deployment of stents have improved markedly over the years. This is proven by a consistent reduction in the rates of stent failure and loss over the preceding decade.[1,2] The causes of stent failure include intrinsic factors such as tortuosity and calcification and operator-related factors such as guidewire or balloon-induced stent distortion.[3] We report a case of wire/balloon-induced stent crumpling remedied by bail-out crushing with a second stent and important learning points for aspiring interventionists.

CASE REPORT

MD is a 56-year-old, male army pensioner who has Type 2 diabetes mellitus, hypertension, hyperlipidaemia and is a lifelong non-smoker with no family history of coronary artery disease.

He presented to a peripheral hospital with typically ischaemic chest pain, noted to have acute ST-elevation inferior myocardial infarction and was duly thrombolysed with Streptokinase. The peak creatine kinase was 840 U/l and his echocardiogram showed a good left ventricular ejection fraction of 56 % with hypokinetic inferior walls.

He was subsequently referred to the National Heart Institute (Institut Jantung Negara, Kuala Lumpur) for coronary revascularization. Coronary angiogram revealed mild atheroma of the left coronary arteries.

The right coronary artery (RCA) was dominant, ectatic with two discrete lesions at the proximal and distal segments of the RCA. We proceeded to angioplasty via a 6F Judkins Right (JR) 3.5 guiding catheter (Launcher®, Medtronic, Minnesota, USA). The distal lesion was stented with a 3.5 x 15 mm bare metal stent - BMS (Blazer®, OrbusNeich, Florida, USA) deployed at 18 atmospheres (atm). The proximal lesion was then tackled with a 4.5 x 24 mm BMS (Driver®, Medtronic, Minnesota, USA) deployed at 18 atm (Figures 1A-D). Post-angioplasty shots showed well expanded stents and good angiographic results.

Corresponding author:

Dr. Azarisman Shah Mohd Shah
Associate Professor,
Department of Internal Medicine,
International Islamic University Malaysia,
Jalan Sultan Ahmad Shah, Bandar Indera Mahkota,
25200 Kuantan, Pahang, MALAYSIA
Ph: (O) +6 09 5716403 (Fax) +6 09 5716770
(h/p) +6 016 2096984
E-mail: risman1973@hotmail.com

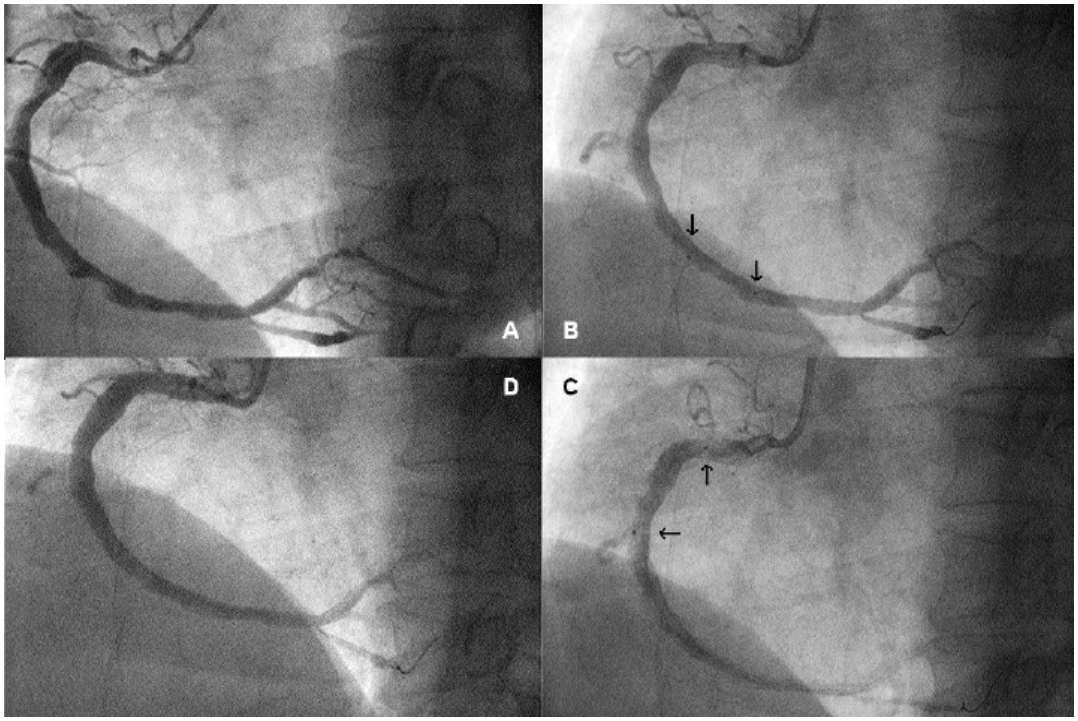

Figure 1A. Coronary angiogram showing a dominant and ectatic RCA with two discrete lesions at the 2nd and 3rd segments of the RCA.
Figure 1B. Position of the Blazer® bare metal stent prior to deployment distally.
Figure 1C. Position of the Driver® bare metal stent prior to deployment proximally.
Figure 1D. Post dilatation cineangiographic shot.

Final fluoroscopic shots, however, taken after wire removal, revealed a short segment of wire-induced, laminar dissection of the posterior left ventricular (PLV) artery where the guide-wire was occasionally 'parked' during the coronary intervention.

Some difficulty was noted during repositioning of the hydrophilic guide-wire (Whisper, Abbott Vascular, Redwood City, CA) prior to the balloon angioplasty and it was initially dismissed as being the result of the distal PLV dissection. The guiding catheter had to be changed to a telescoping technique (6F Amplatz Left 1.0 mother and 5F Heartrail child; Terumo, New Jersey, USA) system for better support as the 6F JR 3.5 kept disengaging during wire repositioning.

The guide-wire position was maintained throughout the process. Final cineangiographic shots then revealed the main reason for the difficult re-wiring. The distal BMS stent had become crumpled in a 'reverse accordion' fashion likely due to wiring through the stent struts during the repositioning or while advancing the balloon for the PLV angioplasty.

Figures 2A and 2B show the comparison in stent lengths before and after crumpling. We then proceeded to crush the crumpled stent from outside the stent struts with a 4.0 x 28 mm BMS (Vision®, Guidant, Indianapolis, USA) deployed at 20 atm with good results. Figures 3A-D shows the crumpled stent prior to (Fig. 3A) and after the crushing (Fig. 3B-D). On follow up three and six months later, the patient was asymptomatic with good functional status.

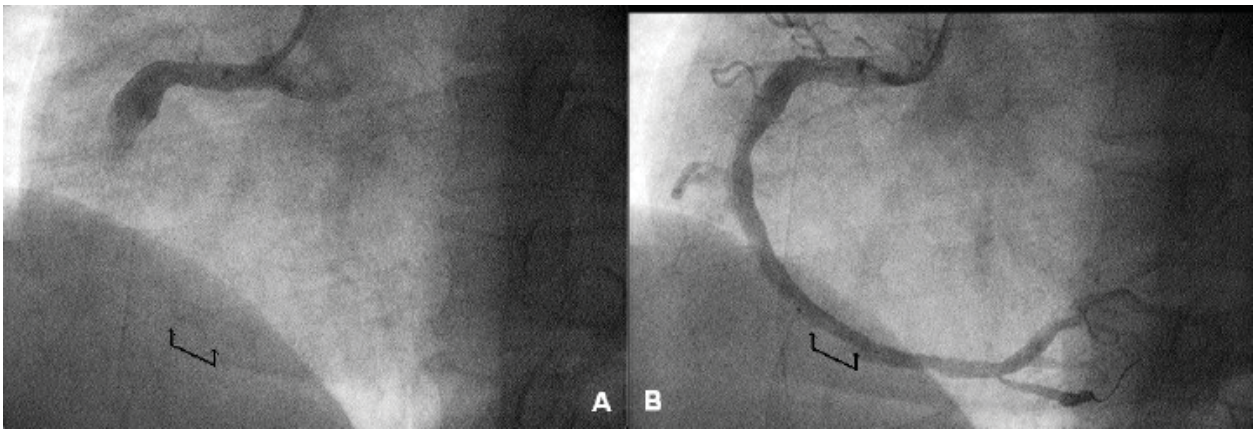

Figure 2A. The length of the crumpled Blazer® stent indicated by arrows.
Figure 2B. The original length of the Blazer® stent compared to the crumpled stent length (indicated by arrows) which is nearly a third of the length shorter.

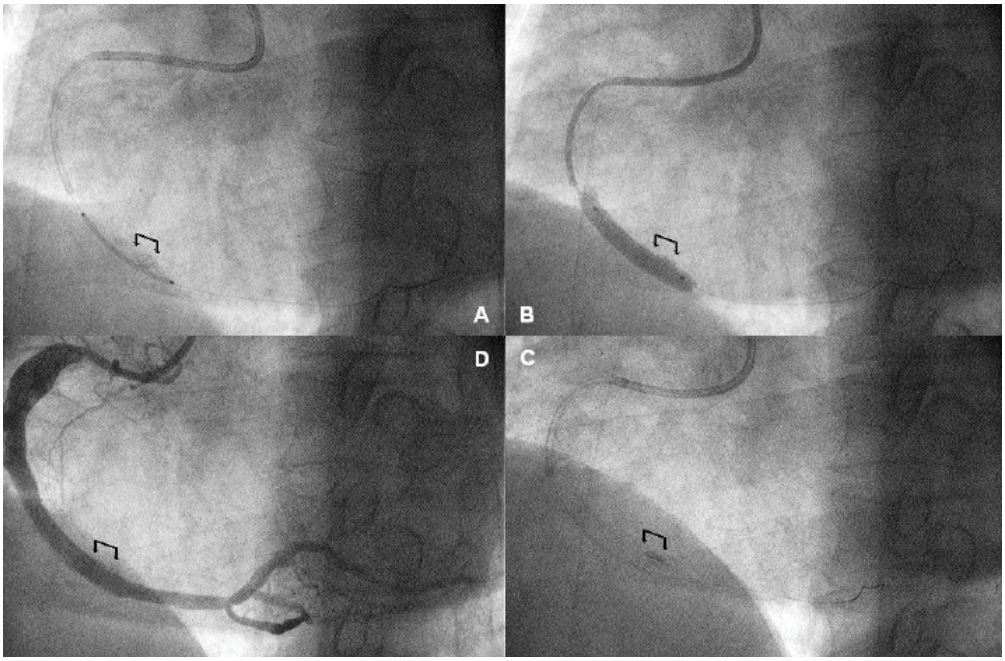

Figure 3A. Crumpled stent indicated by arrows prior to the deployment of a second stent in a crushing fashion.
Figure 3B. Crumpled stent crushed against the vessel wall during balloon deployment.
Figure 3C. Crushed stent between the new stent and the vessel wall.
Figure 3D. Final cineangiographic shot showing good results.

DISCUSSION

Stent distortion can occur before deployment due to tortuosity, calcification and snagging. It can also occur after deployment due to balloon inflation of side-branches through stent struts, entanglement during rewiring and even metal fatigue.[3] Once failed, stents can be retrieved by the small-balloon technique, two-wire technique and loop snare, or they can be crushed.[2,4] These techniques are usually employed in undeployed stents. The options for a distorted, deployed stent are less but the success rate of crushing appears good.[1,5]

Preventive measures include appropriate catheter type and luminal diameter choice, sequential, distal-to-proximal intervention, adequate predilatation, negative pressuring only after crossing the lesion, buddy-wiring and never losing the guidewire. These choices should be thought out with colleagues and superiors before performing any intervention. In this case, a difficult rewiring proved to be due to wiring and/or balloon advancement through the struts of the deployed distal stent and the stent distortion was exacerbated by the employment of a telescoping (mother-and-child) catheter technique for better support.

Any difficulty in re-crossing a segment should be treated with utmost caution as it could signify wire-induced dissection, stent strut entanglement and subsequent stent distortion, or even inappropriate choice of guiding catheter resulting in poor support. These possibilities should have been ruled out before employing such drastic measures as a mother-and-child system as it would have exacerbated the problem as is aptly illustrated in this case report. In summary, before embarking on coronary intervention an aspirant should always play out the intervention, thinking through the options available and preparing for any eventualities should complications occur. In most cases, the simplest option is usually the best.

REFERENCES

1. Nikolsky E, Gruberg L, Pechersky S, et al. Stent Deployment Failure: Reasons, Implications, and Short- and Long-Term Outcomes. Catheter Cardiovasc Interv 2003; 59: 324–28.
2. Brilakis ES, Best PJ, Elesber AA, et al. Incidence, retrieval methods, and outcomes of stent loss during percutaneous coronary intervention: A large single-center experience. Catheter Cardiovasc Interv 2005; 66: 333–40.
3. Hernández-Antolín RA, Suárez A, Corros C. Diagnosis and treatment of coronary stent entanglement complicated by extreme stent distortion. J Invasive Cardiol 2008; 20: E67-70.
4. Eggebrecht H, Haude M, von Birgelen C, et al. Nonsurgical retrieval of embolized coronary stents. Catheter Cardiovasc Interv 2000; 51: 432–40.
5. Colkesen AY, Baltali M, Acil T, et al. Coronary and systemic stent embolization during percutaneous coronary interventions. Int Heart J 2007; 48: 129–36.