Open Access

SCHÓLARENA

SAJ Case Reports

CASE REPORT

ISSN: 2375-7043

Stent Fracture Following Recanalization of a Totally Occluded Artery: A Word of Caution

Bourantas CV[1,2], Veerasamy M[1] and Egred M[1,3*]

[1]Department of Cardiology, Freeman Hospital, Newcastle upon Tyne, UK
[2]University College of London, London, UK
[3]Institute of Cellular Medicine, Newcastle University, Newcastle upon Tyne, UK

[*]**Corresponding author:** Egred M, BSc (Hons), MB ChB, MD, FRCP, FESC, Consultant Interventional Cardiologist & Honorary Senior Lecturer, Freeman Hospital & Newcastle University, Newcastle upon Tyne, NE7 7DN, United Kingdom, Tel: 0044 191 223 1455, Fax: 0044 191 223 1400, E-mail: Mohaned.Egred@nuth.nhs.uk

Citation: Bourantas CV, Veerasamy M, Egred M (2015) Stent Fracture Following Recanalization of a Totally Occluded Artery: A Word of Caution. SAJ Cas Rep 2: 202. doi: 10.18875/2375-7043.1.402

Article history: Received: 27 January 2015, **Accepted:** 11 May 2015, **Published:** 13 May 2015

Abstract

Although the dissection and re-entry strategy using the Crossboss and the Stingray system has increased procedural success, there is lack of evidence about the midterm efficacy of this approach. This report presents a case of stent fracture at the re-entry site at 8 months follow-up. Pre-procedural assessment of the coronary geometry and evaluation of plaque pathology with non-invasive imaging may have a role in minimizing the risk of stent fracture/failure, which as in the present case is likely to be induced by the increased mechanical load and the bending forces at the re-entry site.

Keywords: Stent fracture; Chronic total occlusion; Dissection and re-entry

Introduction

Successful recanalization of chronically occluded coronary arteries has been associated with angina symptom relief, improvement in left ventricular ejection fraction, and better prognosis in selected populations [1]. Over the last few years multiple advances have been introduced including dedicated guidewires, micro-catheters and balloons, in addition to the development of techniques that facilitate the procedure, improve success rate, and decrease procedural time, and radiation exposure. The BridgePoint device system (Boston Scientific, Natwick, MA, USA) - which consists of the CrossBoss, used to create a subintimal channel in the occluded artery, the Stingray re-entry balloon catheter, designed to facilitate wire re-entry; and the Stingray dedicated stiff guidewire which is used to re-enter into the true lumen - has enhanced the success rate of anterograde recanalization through the sub-intimal route. Small scale reports have demonstrated the value of this system in improving procedural success but there is lack of evidence about its long term outcome [2].

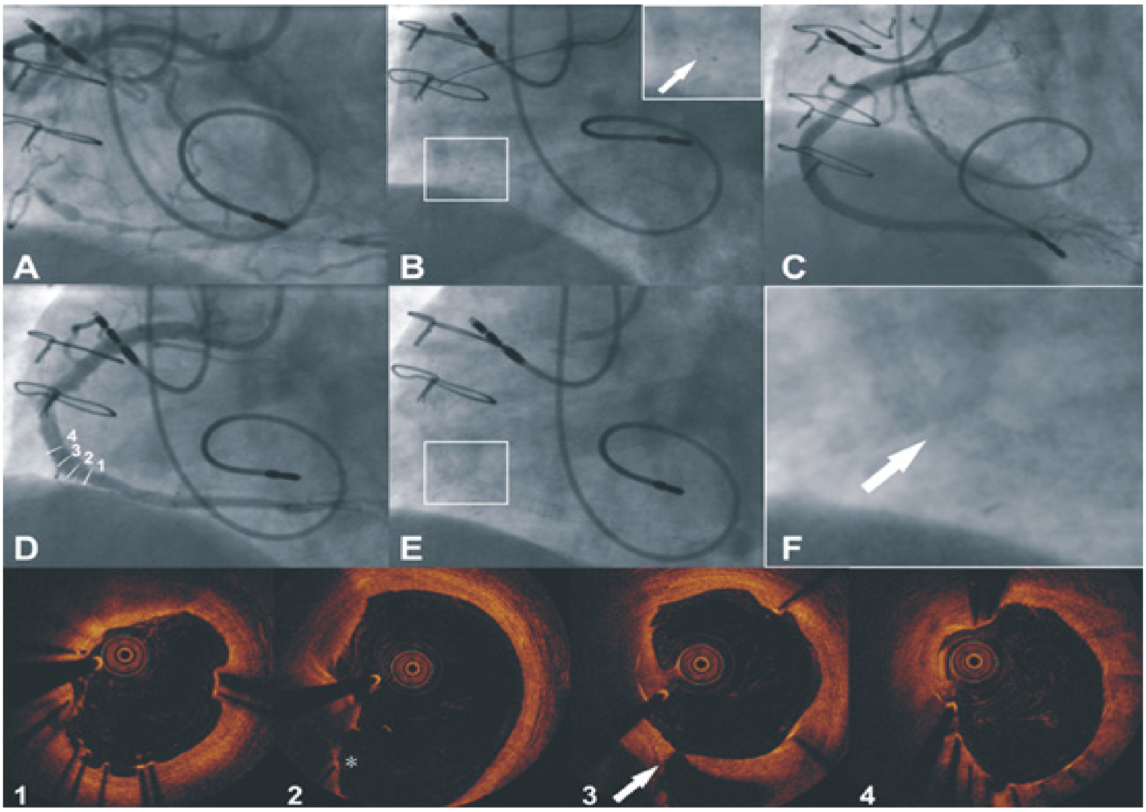
Stent fracture has been reported in first and second generation drug eluting stents (DES), particularly in the 6 connectors, 1st generation Cypher stents. Pre-disposing factors to stent fracture include vessel tortuosity and calcification, long or overlapped, and under-deployed stents [3]. We present a first case of second generation stent fracture that occurred at the re-entry site of a totally occluded calcified right coronary artery (RCA).

Case 1

A 73 year old male with a history of atrial fibrillation, previous permanent pacemaker, antiphospholidic syndrome, deep vein thrombosis, chronic pancreatitis, ischemic heart disease and two previous coronary artery bypass operations [vein grafts to the left circumflex (LCx), and RCA, and left internal mammary artery graft to the left anterior descending artery (LAD)] was referred for coronary angiography because of increased angina symptoms. Coronary angiogram showed severe distal left main stem (LMS) disease into an ostial calcified LCx with occluded LAD and RCA and occluded vein grafts to the RCA and LCx and a patent left internal mammary artery to the LAD. He had an impaired left ventricular function and cardiac magnetic resonance imaging showed viability in the inferior wall and thus he underwent percutaneous coronary intervention (PCI) to the chronically occluded, heavily calcified RCA using anterograde dissection and re-entry strategy with the CrossBoss and the Stingray re-entry system. Four

Xience Prime stents (Everolimus stent, Abbott Vascular, Santa Clara, CA, USA, 3.0x23, 3.0x23, 3.5x38, 4.0x28) were successfully deployed, and post-dilated with excellent angiographic results (Panels A-C).

Although there was a significant improvement in patient's symptoms, he continued to experience exertional angina and was re-admitted 8 months later for rotablation and PCI to the LMS and LCx. Repeat angiography of the RCA demonstrated some ectasia with patent stents and a stent fracture at the previous re-entry site to the true lumen (Panels D-F). Optical coherence tomography (OCT) confirmed the angiographic findings demonstrating no significant neointimal formation and patent stents (Panels 1-4). In view of the absence of a significant luminal obstruction it was decided to not perform any further intervention in the RCA and the patient underwent a successful PCI to the LMS-LCx coronary arteries.



Panel: Coronary angiography at baseline showing a totally occluded right coronary artery (RCA) which supplied collateral to the distal vessel **(A)**. After advancing a CrossBoss device to the subintimal space, a Stingray system (arrow in the magnified view) was used to re-enter in the true lumen **(B)**. Four Xience drug eluting stents were deployed in the RCA with excellent final result **(C)**. At 8 months follow-up the stents were patent; however strut fracture and lumen ectasia was noted at the mid segment of the stents segment **(D, E** and magnified panel **F)**. Optical coherence tomographic imaging confirmed the angiographic findings demonstrating strut facture (indicated by the absence of struts – panel 2) at the re-entry site (panel 3).

Discussion

Although the dissection and re-entry strategy using the Crossboss and the Stingray system has improved procedural success, there is lack of evidence about the mid- and long-term outcome of this approach. In this report stent fracture was noted at 8 months follow-up at the re-entry site. Potential mechanisms that may have led to the stent fracture include an increased mechanical load with the stent passing from the heavily calcified sub-intima to the true lumen space, the re-entry at a bend, the use of a 3 connectors DES (known to be more susceptible to fracture than 2 connectors DES except for the 2 connector BioMatrix DES), and the length of the stented segment.

The stent fracture in this case was within the recognised time frame and although the patient was asymptomatic, it is well documented that it has been associated with late stent failure and cardiovascular events [4]. The occurrence of stent fracture at the site of re-entry after using the Crossboss and Stingray although may be related to the previously documented factors, it should raise alertness about a possible connection with the ever increasing use of this technique. Pre-procedural assessment of coronary geometry and evaluation of plaque pathology with multi-slice computed tomography may have optimized procedure planning allowing identification of the ideal re-entry site (i.e., a segment with a minimal curvature and a fibrotic or lipid rich plaque instead of calcific tissue) minimizing the risk of late stent failure [5]. Vigilance and reporting of PCI outcome in chronic total occlusions, as well as further research is required to assess the mid- and long-term outcome of the dissection and re-entry strategy and examine the use of a non-invasive imaging-based procedure planning on clinical outcomes.

References

1. Suero JA, Marso SP, Jones PG, Laster SB, Huber KC, et al. (2001) Procedural outcomes and long-term survival among patients undergoing percutaneous coronary intervention of a chronic total occlusion in native coronary arteries: A 20-year experience. J Am Coll Cardiol 38: 409-14.

2. Whitlow PL, Lombardi WL, Araya M, Michael Wyman R, Torres H, et al. (2012) Initial experience with a dedicated coronary re-entry device for revascularization of chronic total occlusions. Catheter Cardiovasc Interv 80: 807-13.

3. Ormiston JA, Webber B, Ubod B, White J, Webster MW (2014) Coronary stent durability and fracture: an independent bench comparison of six contemporary designs using a repetitive bend test. EuroIntervention 20140514-02.

4. Hakim DA, Mintz GS, Sanidas E, Rusinova R, Weisz G, et al. (2013) Serial gray scale intravascular ultrasound findings in late drug-eluting stent restenosis. Am J Cardiol 111: 695-9.

5. Magro M, Schultz C, Simsek C, Garcia-Garcia HM, Regar E, et al. (2010) Computed tomography as a tool for percutaneous coronary intervention of chronic total occlusions. EuroIntervention G: G123-31.