CASE REPORT

Very delayed coronary stent fracture: A case report

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Abstract A stent fracture is an emerging complication of the coronary stents. There are numerous risk factors for stent fractures; which include forceful exaggerated motion in the atrioventricular groove seen in right coronary artery, long stent, an ostial lesion at the point of maximum curvature in a tortuous vessel, stent over-expansion, stent overlapping with different size stents, complex lesion after stenting of a totally occluded vessel, Cypher stent and a highly mobile segment causing high mechanical stress. Furthermore, chronic stretch at specific vessel sites as bends may lead to late occurrence of fracture.

Here we report a case of 40-year-old male who had two overlapping Cypher stents (3.0 × 13 mm and 2.75 × 18 mm) deployed at mid left anterior descending artery 2 years earlier presented with progressive chest pain.

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1. Introduction

While the incidence of drug-eluting stent (DES) fracture may be low, it is a clinically important entity and appears to be associated with an increased risk for stent thrombosis, myocardial infarction, and angina. Cypher stents appear to be associated with stent fracture at a higher rate than other DES (Chhatriwalla et al., 2009). Several cases of DES fractures have been described and suggested as one of the potentially serious complications of coronary intervention with DES (Aoki et al., 2007; Lee et al., 2007; Park et al., 2007; Shite et al., 2006), although DES fractures reported frequently in long coronary lesions (Aoki et al., 2007). Data about the incidence, predictors, and outcomes of DES fractures were limited in selected patients group with long coronary disease.

Stent fracture is considered as a potential mechanism of restenosis after SES implantation (Sianos et al., 2004).

We report a case of delayed stent fracture after percutaneous coronary intervention (PCI) with SES.

2. Case report

A 40-year-old man, a cigarette smoker, with hypertension and dyslipidaemia presented with dyspnoea and angina on mild effort with pre-syncope episodes on two occasions. He had primary PCI to the mid portion of left anterior descending artery (LAD) for acute anterior myocardial infarction with two overlapping Cypher stents (3.0 × 13 mm and 2.75 × 18 mm) deployed at 12 atmospheric pressure then post dilated with...
3 × 12 mm balloon to 16 atmospheric pressure on 5th of July 2008 (Fig. 1). An ECG showed Q-wave and T-wave inversion in V2–V6. Echocardiography revealed akinetic anterior and anterior apical wall with an ejection fraction of 35% and mild to moderate mitral regurgitation. His medications include: Aspirin 81 mg daily, Clopidogrel 75 mg daily, Fosinopril 5 mg daily, Carvedilol 6.25 mg twice daily, Furosemide 40 mg daily and spironolactone.

Coronary angiogram showed a fracture of LAD stent with filling defect likely represents stent thrombosis (Fig. 2). Intravascular ultrasound (IVUS) revealed well opposed stents with loss of stent integrity which was confirmed by stent boost that revealed a strut fracture of mid portion of the distal stent (Fig. 3). The decision was made to perform PCI where resolute integrity stent (Medtronic, Inc.) 3.0 × 26 mm deployed distally and 3.0 × 18 mm proximally with overlap with good final result (Fig. 4). He was discharged home after uneventful hospital course.

3. Discussion

Current registries published the incidences of DES fracture ranging from 1.7% to 2.6% (Aoki et al., 2007; Lee et al., 2007). Usually, stent fracture occurred in long stent implanted with a larger balloon at high pressure or overlapping site of
stents, especially when it was placed in tortuous vessels or calcified lesions (Sianos et al., 2004). However, in selected lesions treated with long SES, the incidence of fracture was relatively common compared with PES (2.9% vs. 0.5%). This finding led to suggestion about the possible association of stent structure with fracture (Lee et al., 2007). The factors that predispose to stent fracture are long stent, vein graft, or the RCA lesion, where the lesion location at the RCA increased the risk of fracture by 8-fold compared with non-RCA (Kim et al., 2009).

Stent fracture is found in 29% of the stented lesions at autopsy, which is higher than clinically reported (Nakazawa et al., 2009). Stent fracture is classified as isolated strut fractures (type 1, single-strut fracture; type 2, incomplete transverse fracture) and complete fracture (type 3, complete transverse fracture without displacement; type 4, transverse fracture with displacement) (Nakazawa et al., 2009).

In our case, Cypher stent was deployed in the LAD which was not tortuous and the post dilation pressure not excessively high (16 ATM) but stent length and torsional forces just distal to the region of stent overlap may explain the stent fracture.

The closed cell design and thin interconnecting links of SES with use of larger balloon for post dilation may explain Stent Fracture.

Although, the exact mechanisms of delayed strut fracture are unknown, therefore, the alteration of the structural stent characteristics by drug carrier vehicle is one of the possible mechanisms of stent fracture.

An IVUS and stent boost are the two methods used to confirm stent fracture after high suspicion by angiographic image. Stent boost is an enhanced subtracted image automatically generated from a single standard acquisition at 15 frames per second consisting of 2 s without contrast to improve stent visualization with the balloon left in place for motion compensation of the acquired images.

Stent boost provided superior correlations for stent expansion measured by IVUS compared to quantitative coronary analysis (Mishell et al., 2007).

Optical coherence tomography (OCT), with its excellent resolution of 10–15 μm, has been described as confirming the stent fracture diagnosis, or even detecting cases missed by angiography (Barlis et al., 2009).

The stent fracture is identified and successfully treated by repeat stenting with a different type of stent with a higher flexibility. The Resolute Integrity DES is considered open cell flexible stent and less affected by torsion forces, and long stent used to cover the entire area where these forces occur at edges of old stents.

References


