

Multiple Stent Fractures After Everolimus-Eluting Stent Implantation Causing Acute Myocardial Infarction

A Case Report

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Abstract: Stent fracture is an uncommon complication of drug-eluting stent implantation, but it has a clinical significance because of its potential association with adverse cardiac events such as in-stent restenosis, target lesion revascularization, and stent thrombosis. Multiple stent fractures account for a small proportion, but they may lead to more serious complications. Newer generation drug-eluting stents are designed for improved safety and efficacy compared with early generation drug-eluting stents. Multiple stent fractures after newer generation drug-eluting stent implantation are a rare case.

We report a case of 25-year-old male who presented with acute myocardial infarction caused by multiple stent fractures after everolimus-eluting stents implantation and was treated by balloon angioplasty.

Physicians should be aware of the possibility of multiple stent fractures even after newer generation drug-eluting stent implantation.

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INTRODUCTION

Drug-eluting stents (DES) have become the primary treatment modality for percutaneous coronary intervention owing to the significantly reduced incidence of in-stent restenosis compared to bare metal stents.¹ The early generation DES, sirolimus-eluting stent, showed favorable long-term outcomes.² However, stent fracture has been an important clinical issue of sirolimus-eluting stent because of its potential association with in-stent restenosis, target lesion revascularization, and stent thrombosis.³

The everolimus-eluting stent is a new generation drug-eluting stent which is based on a thin-strut, cobalt-chromium alloy platform and releases everolimus, a semisynthetic sirolimus analog, from an acrylic and fluoropolymer mixture.⁴ This new DES has been designed for improved safety and efficacy compared with sirolimus-eluting stent.⁵ Based on these enhanced properties, the everolimus-eluting stent has shown

promising clinical outcomes in previous clinical trials.⁴ However, in this report, we describe a case of 25-year-old male presenting acute myocardial infarction because of multiple stent fractures after everolimus-eluting stents implantation. We obtained written informed consent from the patient for publication of this case report and any accompanying images.

CASE REPORT

A 25-year-old man with end-stage renal disease secondary to nephrotic syndrome presented with acute chest pain. His initial heart rate was 107 beats/min and blood pressure was 100/60 mm Hg. An initial electrocardiogram showed ST elevations in leads II, III, and aVF. The initial levels of CK-MB and troponin T were 1.50 and 0.08 ng/mL and peaked at 27.30 and 1.47 ng/mL. About 10 months ago, he was admitted for unstable angina and successfully treated by deploying 2 everolimus-eluting stents (Xience Xpedition 3.5 × 38 mm and 2.75 × 38 mm, Abbott Vascular, Santa Clara, CA) in the right coronary artery (Figure 1A and B).

Emergency coronary angiography revealed a thrombotic total occlusion at the distal right coronary artery (Figure 2A). During the primary percutaneous coronary intervention, a gap was found at the proximal portion of the totally occluded site, which was indicative of a stent fracture (Figure 2B and C). We also found multiple stent fractures in other segments in the right coronary artery (Figure 2D–F). Balloon angioplasty for right coronary artery was performed using Ikazuchi 1.2 × 6 mm balloon (Kaneka Medics, Tokyo, Japan), Maverick 1.5 × 15 mm balloon (Boston Scientific, Natick, MA), and Ryujiin 2.0 × 15 mm and 2.5 × 15 mm balloons (Terumo, Tokyo, Japan) (Figure 1C). The patient was discharged in stable condition.

DISCUSSION

The incidence of stent fracture after DES implantation has been reported up to 8% in clinical studies.^{6,7} Stent fracture after DES implantation is an infrequent but potentially serious complication because of its association with higher cardiac event rates.⁵ The mechanisms of stent fracture have not yet been completely understood. However, several predisposing risk factors for stent fracture have been suggested.^{3,8} Anatomic risk factors are tortuous vessels, right coronary artery, and long lesions. Stent-related risk factors are longer stents and sirolimus-eluting stent implantation. Procedural risk factors are balloon overexpansion and overlapping stents.^{3,8} In our case, the implantation of longer and overlapping stents at right coronary artery might have contributed to stent fractures.

Most cases of multiple stent fractures after DES implantation were reported in sirolimus-eluting stent implantation.³ The sirolimus-eluting stent has a relatively thick, rigid, and

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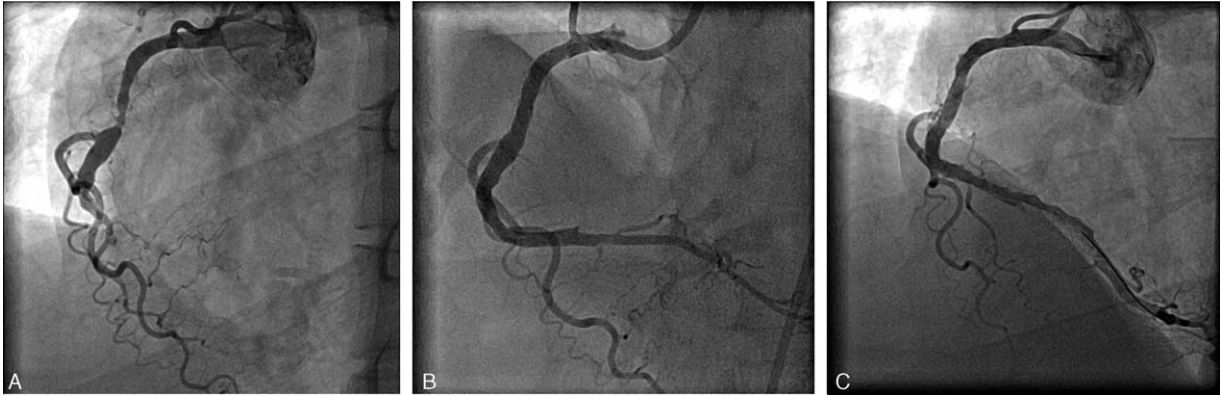


FIGURE 1. Serial coronary angiograms (A) Initial coronary angiogram revealed total occlusion at mid to distal right coronary artery. (B) The patient was treated by deploying two overlapping everolimus-eluting stents. (C) About ten months later, the patient presented with inferior ST elevation myocardial infarction due to acute thrombotic occlusion at the distal right coronary artery. Angiographic result after balloon angioplasty was acceptable.

closed-cell structure with less flexibility and conformability and be more prone to fracture.³ On the contrary, the everolimus-eluting stent has a thin-strut, open-cell design, and cobalt-chromium platform with high flexibility and conformability, which is expected to have potential advantages over sirolimus-

eluting stent.⁵ However, in a recent study, stent fracture after everolimus-eluting stent implantation was observed in 2.9% of lesions and was associated with a higher rate of myocardial infarction, target lesion revascularization, and stent thrombosis.⁵ Furthermore, the present case showed that multiple stent fractures

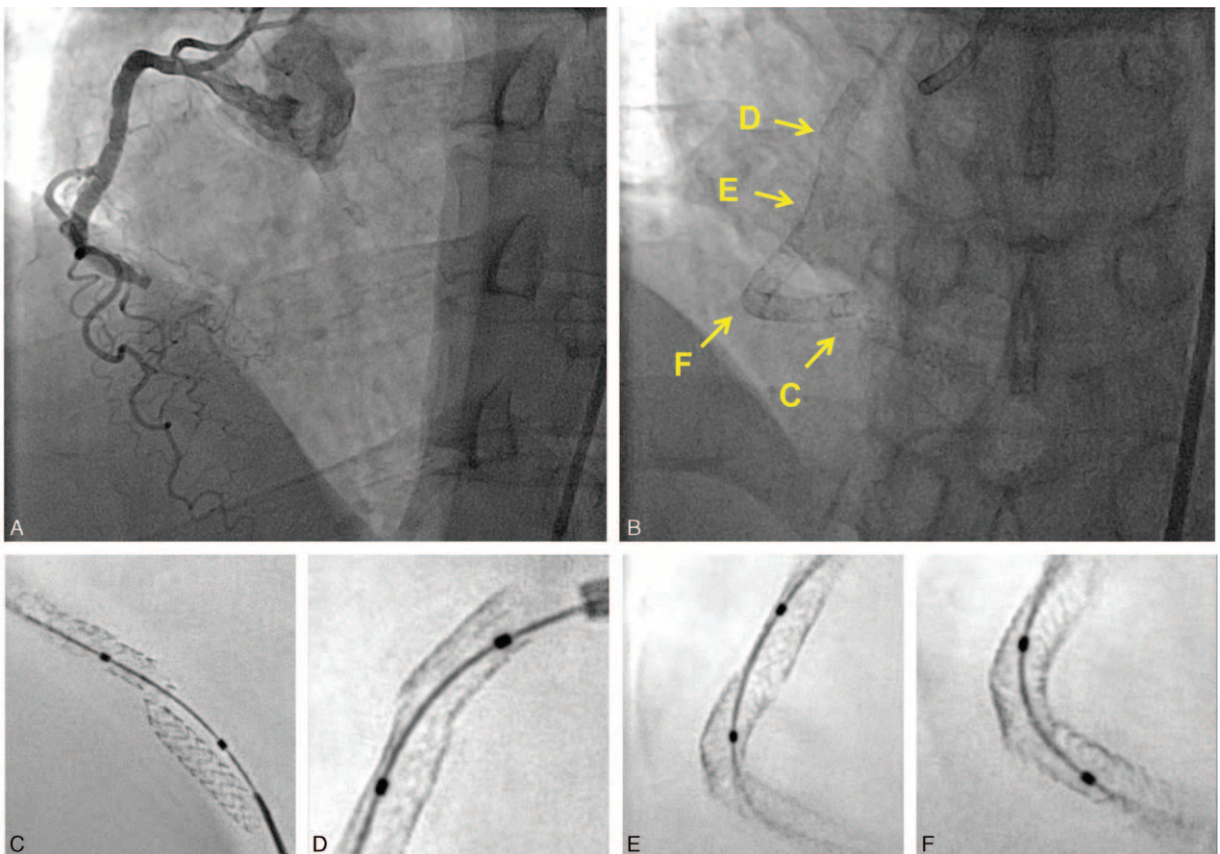


FIGURE 2. Images of multiple stent fractures after everolimus-eluting stent implantation. (A) The angiogram revealed a thrombotic total occlusion at the distal segment of right coronary artery. (B) Fluoroscopic imaging shows multiple fractures (arrows) of the implanted everolimus-eluting stents. (C–F) Fluoroscopic images obtained using a stent enhancement tool (CLEARstent, Siemens Healthcare, Forchheim, Germany) also demonstrated the multiple stent fractures.

could occur even after new generation everolimus-eluting stent implantation and be associated with unfavorable cardiac events. Therefore, physicians should be aware that various contributing factors mentioned above for the occurrence of stent fracture and multiple stent fractures could be possible even after new generation DESs implantation.

CONCLUSION

Multiple stent fractures are rare complication after newer generation DES implantation. However, they may be associated with more serious cardiac events. Therefore, we should pay special attention to the possibility of multiple stent fractures even after newer generation DES implantation.

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