1105 **Successful management of a giant coronary artery aneurysm following double-layered stent fracture with graft stent implantation: A case report**

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Introduction

Percutaneous coronary intervention (PCI) with drug-eluting stents (DES) has revolutionized the treatment of coronary artery disease, offering better outcomes and lower rates of restenosis.1-3 However, despite advancements in stent technology, complications such as in-stent restenosis, stent fracture, and the rare occurrence of coronary artery aneurysms (CAA) still arise.3 Stent fracture, in particular, can be associated with aneurysmal changes, potentially leading to poor clinical outcomes and making PCI-based revascularization more challenging. Currently, there are no definite strategies for managing these complex complications.4,5 Therefore, we present a case involving the treatment of a double-layered DES fracture with a giant coronary artery aneurysm.

Case Summary

A 75-year-old male with history of hypertension, diabetes, dyslipidemia and chronic kidney disease presented to the emergency department with chest pain. The patient was diagnosed with an acute non-ST elevation myocardial infarction, with elevated high-sensitive troponin I levels (2.184ng/mL; reference range 0~0.04ng/mL). Transthoracic echocardiography revealed regional wall motion abnormalities in the right coronary artery (RCA) territory. The patient had previously undergone two PCIs at the same proximal RCA site. The first PCI involved the implantation of a 3.5×26mm DES (Cre 8, Alvimedica, Saluggia, Italy) 15 months prior, and the second PCI used a 3.5×23mm DES (Xience Sierra, Abbott, Santa Clara, CA) at the same proximal RCA site due to in-stent restenosis 9 months earlier (Figure 1A).

Immediate coronary angiography revealed a definite stent fracture with a large gap and a giant aneurysm within the previous double-layered DES at the proximal RCA. Additionally, the distal flow below the aneurysm was completely occluded (Figure 1B). Initially, wiring was attempted, but could not be passed successfully beyond the aneurysm. Without prolonging the effort, coronary computed tomography angiography (CCTA) was performed to evaluate coronary anatomy and aneurysm characteristics. CCTA confirmed stent fracture and a giant aneurysm, with a diameter of 23.24mm (Figure 1C). Using this information, we made a second PCI attempt. After several tries, successful wiring beyond the aneurysm was achieved with the Fielder XT-R. Intra-vascular ultrasonography (IVUS) was then to confirm the true lumen and morphology of aneurysm. IVUS findings confirmed that the wire was located within the true lumen of both the aneurysm and the distal vessel, with a diameter of 3.43 mm (area 8.19 mm?) (Figure 2). At the site of the stent fracture and aneurysm in the proximal RCA, a 3.5×19mm graft stent (Graftmaster, Abbott, Santa Clara, CA) was implanted (Figure 3A). Post-implantation, final IVUS and coronary angiography confirmed successful graft stent placement and complete sealing of the aneurysm, with good apposition of the graft stent to the previous stent and a smooth lumen contour (Figure 3B). Additional stents were implanted in mid to distal RCA lesions. Final angiography showed successful results without complications. ?

Discussion

Stent fracture is a rare complication following coronary stenting.4 The incidence rate of stent fractures of DES was reported as 29% in earlier studies6, while more recent studies have indicated a lower rate of 5.5%.5 Although the incidence of major fractures (defined as complete separation or disruption of a stent strut) has decreased in new-generation DES(0.5%) compared to first-generation DES(4.7%)7 due to advancements in stent design and polymer technology8, stent fracture can still occur even with the second-generation DES.

A coronary artery aneurysm (CAA) caused by a stent fracture is a rare and potentially life-threatening complication of PCI. CAAs can lead to complications, such as thrombosis, distal embolization, acute coronary syndrome, and rupture which may result in cardiac tamponade and fatal. Therefore, appropriate management of CAAs is crucial.9

Various therapeutic strategies, including observation, antiplatelet or antithrombotic therapies, surgical treatment, stent or covered stent implantation, and coil embolization, have been used for the treatment of CAAs.4,10 However, due to the lack of randomized trials or large-scale data, optimal management strategies and clinical outcomes remain unclear. Consequently, treatment strategies should be tailored to the CAA's location and morphology, as well as the patient's characteristics and clinical presentation.11

This case represents a rare and complex instance of a double-layered DES fracture with a huge CAA. Despite these challenges, the patient was successfully treated with image-guided PCI, including the implantation of a graft stent at the site of the stent fracture and aneurysm. The procedure was completed without complications, demonstrating the efficacy of PCI in managing even the most complicated stent failure cases without requiring surgical intervention.

The successful resolution of this case using PCI and imaging modalities highlights this approach as a safe and effective therapeutic option for complex and potentially life-threatening complications of coronary interventions. This case may contribute to developing future treatment guidelines for managing such complex cases.

Conclusion

This case represents the successful management of the rare complication of double-layered DES fracture with a CAA. Image-guided PCI with a graft stent effectively sealed the aneurysm. This case illustrated that PCI can be a safe and effective option for complex stent-related complications.