Journal of Cardiology Cases 17 (2018) 4–8

Contents lists available at ScienceDirect

Journal of Cardiology Cases

journal homepage: www.elsevier.com/locate/jccase

Case Report

Three-year follow-up optical coherence tomography of under-expanded drug-eluting stent in-stent restenosis treated with ABSORB bioresorbable vascular scaffold following ultra-high pressure pre-dilatation

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ARTICLE INFO

Article history:
Received 9 November 2016
Received in revised form 14 July 2017
Accepted 11 August 2017

Keywords:
Bioresorbable vascular scaffold
In-stent restenosis
High pressure balloon

ABSTRACT

The management of in-stent restenosis continues to be a common challenge in modern interventional cardiology. Drug-eluting stents have emerged to be an effective treatment following bare-metal stent in-stent restenosis as compared with drug-coated balloon angioplasty and repeat bare-metal stenting. The addition of another metallic layer is however undesirable and may limit further treatment options. In the last few years, everolimus-eluting bioresorbable vascular scaffolds have become available in treating native coronary artery disease with complete hydrolysis into water and carbon dioxide within 3–5 years. To exploit this property, we successfully used it to manage a case of drug-eluting stent in-stent restenosis from a previously under-expanded stent as demonstrated in this case. Small registry series have also recently been published supporting favorable outcomes with this approach. To the best of our knowledge, this case has the longest optical coherence tomography follow-up beyond 3 years.
<**Learning objective:** The dedicated dual-layer OPN NC balloon (Schwager Medica, Winterthur, Switzerland) could be used in the under-expanded metallic stent that is not overcome by conventional non-compliant balloons as demonstrated in our case. The application of bioresorbable vascular scaffold in drug-eluting stent in-stent restenosis has satisfactory medium- to long-term clinical outcome. The 3-year follow-up intracoronary study demonstrated complete tissue coverage of the scaffold. Complete bioresorption of the scaffold, by hydrolysis into carbon dioxide and water, takes approximately 3–5 years, thus avoiding another layer of metallic cage.>

Introduction

From the early days of plain old balloon angioplasty (POBA), restenosis has been the “Achille’s heel” of percutaneous coronary revascularization. Bare-metal stents (BMS) have reported restenosis rates of up to 20% within the first year of treatment [1,2]. Drug-eluting stents (DES) were designed with the intention of reducing the high in-stent restenosis (ISR) rates associated with neointimal proliferation and have proven to be effective both angiographically and clinically, particularly in high-risk patients [3]. Restenosis has not however been abolished and ISR when encountered is a difficult iatrogenic clinical problem to manage. Currently, DES and drug-coated balloon (DCB) are both considered to be the main treatment modalities for ISR with drawbacks from each modality, such as an additional layer of metal and higher restenosis rate, respectively [4]. Recently, bioresorbable vascular scaffolds (BVS) have been demonstrated to be used successfully and safely in ISR lesions [5]. The property of temporary scaffolding resolves the issue of a permanent layer of metal as well as improved acute gain compared to balloon angioplasty alone. This case report will demonstrate a successful use of BVS in an ISR lesion with long-term optical coherence tomography (OCT) follow-up beyond 3 years.

Case report

A 57-year-old man underwent percutaneous coronary intervention (PCI) to the mid left anterior descending (LAD) artery with a 2.25 × 32 mm everolimus-eluting stent for unstable angina. Post-dilation of the proximal stent segment however was unsuccessful despite multiple inflations with a 2.75 × 10 mm

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http://dx.doi.org/10.1016/j.jccase.2017.08.015
1878-5409/

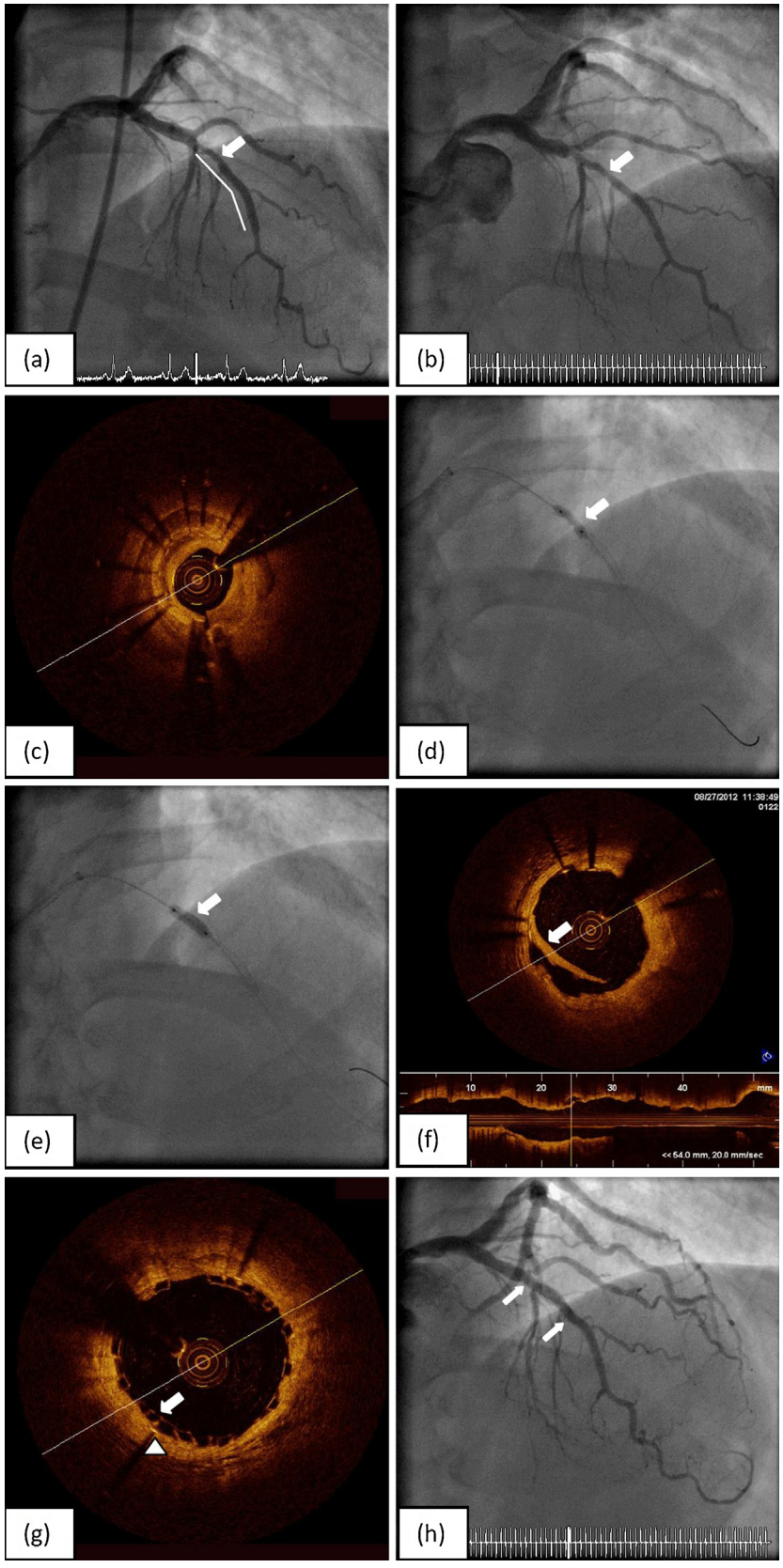

Fig. 1. (a) Previous final angiography from mid left anterior descending artery stenting (solid line) showed under-expanded stent segment (arrow). (b) Diagnostic coronary angiography on this occasion demonstrated significant in-stent restenosis at the under-expanded stent segment (arrow). (c) Optical coherence tomography (OCT) confirmed significant in-stent restenosis at the under-expanded section. (d) Multiple balloon inflation failed to open up the tight stenosis (arrow). (e) The 3.0 × 10 mm OPN NC balloon was able to overcome the under-expanded area at 35 atm. (f) Repeated OCT confirmed adequate expansion of the stent at stenosis site with a dissection flap (arrow). (g) OCT following ABSORB bioresorbable vascular scaffolds (BVS) implantation demonstrated satisfactory