OCT-guided complication management during sirolimus-eluting bioresorbable magnesium stent im-plantation with 9-months OCT follow-up.

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Abstract

We performed an OCT-guided PCI to a 54 years old lady with NSTEMI. After a sirolimus-eluting BRS implantation, a second BRS was lost in the coronary artery. OCT helped us to implant the lost BRS together with two more drug-eluting stents. At 9-months follow-up OCT showed a good result.

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Keywords: OCT, BRS; PCI.

Key Clinical Message: Our case highlights the value of OCT guidance for optimal BRS implantation and for strategy selection during PCI as well as the efficacy of sirolimus-eluting bioresorbable magnesium scaffolds for de-novo coronary lesions treatment.

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Case history : a 54 years old lady, active smoker with hypertension and hyperlipidemia, presented at our ED with atypical chest pain. EKG was unremarkable while echocardiogram showed mild inferior hypokinesia with normal LVEF (55%). Positive biomarkers for myocardial damage were found. After obtaining written informed consent, the patient underwent coronary angiography the same day of admission. A significant

stenosis of the mid-right coronary artery (RCA) was found (Figure 1). Since the patient was young, the interventional plan was to implant a sirolimus-eluting bioresorbable magnesium scaffold on the mid-RCA via right radial artery access with OCT guidance. A 6 French Amplatz Left 1 guiding catheter was positioned at the RCA ostium and two workhorse coronary wires were passed through the lesion for higher support. Predilation with a 2.5 x 15 mm semi-compliant balloon at 12 atm was performed. OCT pullback showed a long significant stenosis with a balloon-induced dissection in the distal part of the lesion (mean vessel diameter 2.86 mm), an eccentric calcific plaque in the mid-segment and a normal vessel in the proximal landing zone (mean vessel diameter 3.38 mm) (Figure 2). Further 1:1 balloon/artery ratio pre-dilation was performed with a 3.0 x 15 mm non-compliant balloon at 12 atm. After checking for good expansion of the 3.0 mm balloon in two orthogonal views, a 3.0 x 25 mm sirolimus-eluting bioresorbable magnesium scaffold was implanted at 12 atm. Post-dilation with a 3.5 x 12 mm non-compliant balloon was performed at 18 atm (Figures 3 and 4). OCT evaluation revealed the extension of significant dissection (>300 μm) at distal edge (Figure 5). For this reason, the advancement of a second BRS was attempted, in order to cover the distal edge dissection. After two attempts, dislocation of the BRS from its delivery system occurred, with the BRS lying into the proximal segment of the coronary artery, proximally to the previously implanted scaffold (Figure 6). At this point, a thin-struts 3.5 x 26 mm drug-eluting stent (DES) was passed through the lost BRS in the proximal RCA and, after checking for sufficient overlapping with the first BRS implanted, the DES was deployed at 14 atm (Figure 7). The decision to deploy a DES (3.5 mm) within the dislocated BRS, instead of a expanding a balloon, was dictated by three main reasons: it was highly probable that the lost BRS might have reported some injury during its dislodgement (the dislodgement occurred pulling back the scaffold into the guiding catheter) which was not reassuring in terms of predictable outcomes; the dislocated BRS was a 3.0 mm scaffold, smaller than the vessel size in that segment; the dislocated BRS was not in overlap with the previously implanted scaffold. The distal edge dissection was then covered with a second 3.0 x 18 mm DES deployed at 14 atm (Figure 7). An OCT pullback was performed confirming good stents and scaffold apposition, short overlap between the BRS and the two DES, and presence of the lost BRS fully expanded and embedded into the vessel wall completely covered by the proximal DES struts (Figure 8). A final good result was obtained with a TIMI 3 flow (Figure 7). The patient was discharged after uneventful hospital stay two days later.

Follow-up : at 9-months angiographic follow-up the coronary artery looked good with TIMI 3 flow and absence of stent/scaffold restenosis (Figure 9). OCT analysis showed optimal stent apposition in the distal segment with no neo-intimal hyperplasia, advanced reabsorption process of the BRS in the mid-segment with black boxes still visible and good stent apposition in the proximal part with some non-significant acquired malapposition probably due to the dislocated BRS reabsorption between the vessel wall and the DES metallic struts (Figure 10).

Discussion : The rationale for using BRS during PCI are numerous since they provide temporary structural support to the vessel while eluting an anti-proliferative drug, and can be reabsorbed in a time-predictable fashion (1). The first BRS introduced in the market, the Absorb BVS, have shown, after initial positive results (2), higher scaffold thrombosis rates when compared to last-generation drug-eluting stents (3). Notwithstanding a limited clinical evidence available to date, magnesium-based BRS represent an interesting novelty in this field, promising higher radial force than PLLA-based BRS. Our case shows a good angiographic and OCT mid-term result after magnesium BRS implantation although a procedural complication occurred. OCT provided precious information for complication management and interpretation.

Author Contribution:

Gianluca Caiazzo conceived and wrote the manuscript draft.

Mario De Michele have been involved in drafting the manuscript and revising it critically for important intellectual content.

Luca Golino have been involved in drafting the manuscript and revising it critically for important intellectual content.

Vincenzo Manganiello have been involved in drafting the manuscript and revising it critically for important intellectual content.

Luciano Fattore have been involved in drafting the manuscript and revising it critically for important intellectual content and gave final approval of the version to be published.

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Figure Legends

Figure 1

Angiographic evidence of a significant stenosis in the mid-RCA.

Figure 2

(a) A balloon-induced dissection in the distal part of the lesion with some luminal thrombus and an eccentric calcific plaque is evident in the cross-section. (b) In the mid-segment of the RCA the cross-section shows a calcific plaque extended to more than 2 quadrants (arrows heads). (c) Healthy coronary segment in the proximal landing zone.

Figure 3

Predilation with a 3.0 mm non-compliant balloon checked in two orthogonal angiographic views showing good expansion of the ballon.

Figure 4

3.0 x 25 mm sirolimus-eluting BRS deployment (a) optimized with a 3.5 x12 mm non-compliant balloon expanded at 18 atm (b) with a good angiographic result (c).

Figure 5

The OCT pullback after BRS implantation shows a large dissection at the distal edge (a) and well expanded BRS with fully apposed struts in the mid-segment (b).

Figure 6

Angiography shows the second BRS lost in the proximal segment (red circle indicating one of the markers of the dislodged BRS). Red arrows show the markers of the deployed BRS.

Figure 7

Angiographic still frames show the 3.5 x 26 mm DES implanted within the dislodged BRS in the proximal segment (a) and the 3.0 x 18 mm DES deployed distally to the previous BRS (b) with good final angiographic result (c).

Figure 8

Final OCT pullback. (a) The cross-section shows good apposition of the DES struts in the distal part covering the dissected segment. (b) Good expansion and apposition of the BRS struts. (c) Short BRS-DES

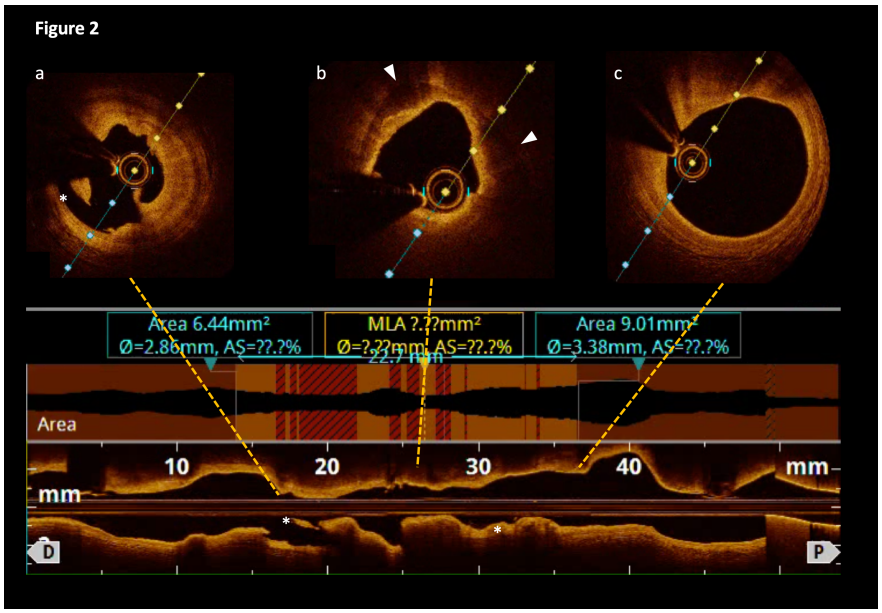
overlap. (d) DES struts well apposed to the vessel wall proximally to the overlap zone with the BRS. (e) DES expanded inside the "lost" BRS with a good expansion of both devices. (f) Non significant malapposition of the DES struts at the proximal edge level.

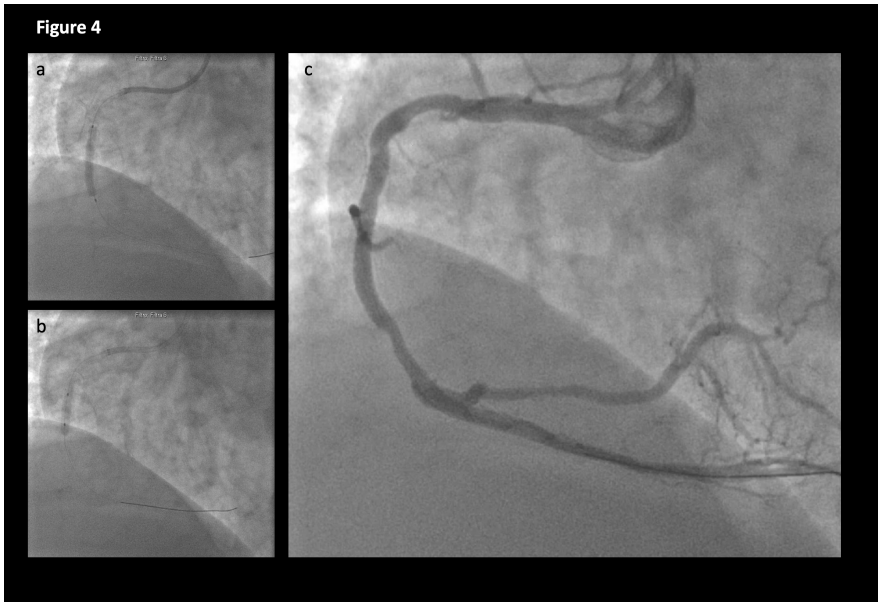
Figure 9

Angiographic view of the RCA at 9-months follow-up.

Figure 10

Complete endothelialization of the distal DES struts. (b) Good MLA with evidence of an advanced reabsorption process of the BRS with black boxes still visible (white arrows) in the context of the neo-intima and well separated by the media (arrow heads). (c) The stent struts rendering function of the co-registration identifies the DES metallic struts only. (d) The cross-section highlights the BRS black boxes (arrow head) "covered" by the DES metallic struts (white arrow). (e) Acquired malapposition of the proximal DES at the proximal edge level. (f) OCT long view showing good lumen profile and MSA.





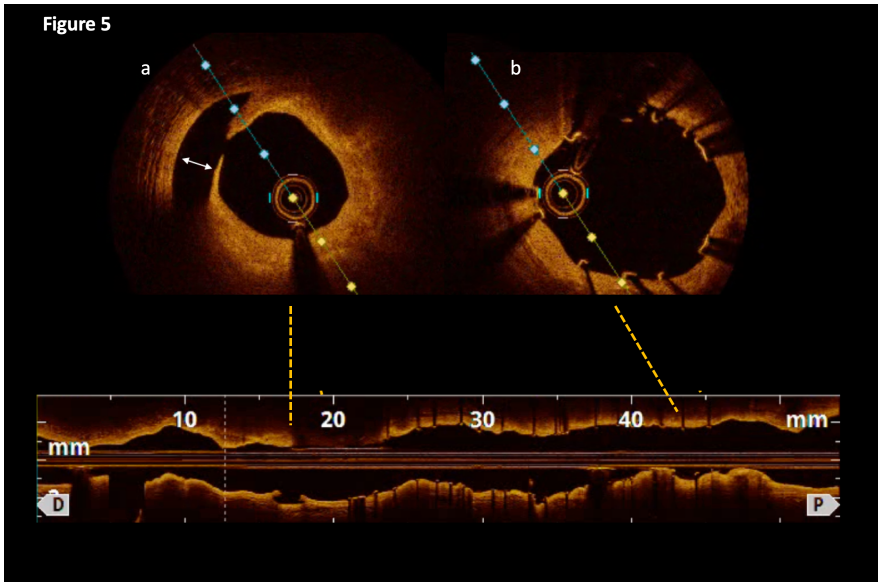


Figure 6

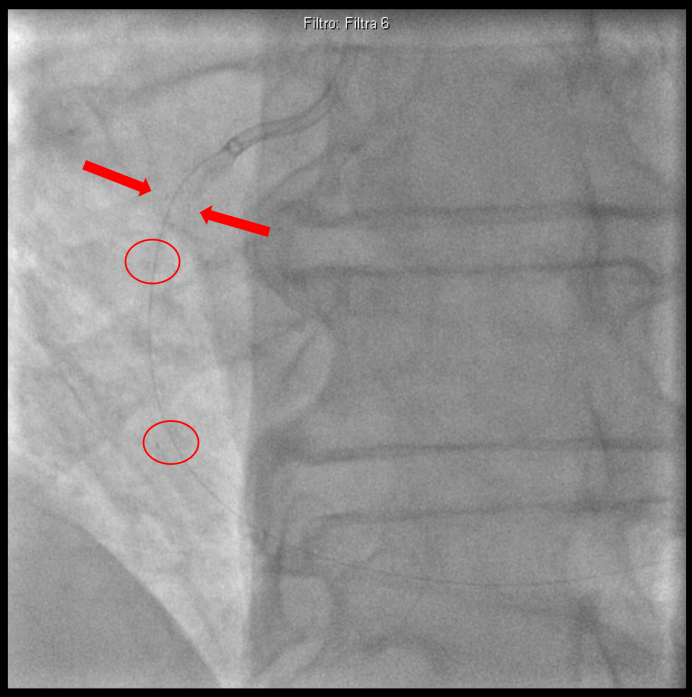


Figure 7