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PERCUTANEOUS CORONARY INTERVENTION BY BIORESORBABLE SCAFFOLDS: ABOUT TWO CASES AT THE CARDIOLOGY DEPARTMENT OF THE ARISTIDE LE DANTEC HOSPITAL-SENEGAL.

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ABSTRACT

The Bioresorbable Vascular Scaffold (BVS) is a transitional support for the vessel, allowing it to heal and return to a natural state after resorption. We studied two patients who underwent percutaneous coronary intervention (PCI) with a BVS in the cardiology unit of the teaching hospital Aristide Le Dantec, Dakar Senegal. The first patient was a 76-year-old male with several cardiovascular risk factors. He presented with an ST-segment elevation myocardial infarction within thrombolysis delay. Coronarography showed a sub-occlusion of the left anterior descending artery (LAD). A PCI using a BVS was performed with good clinical outcome and no intra-stent restenosis after 6 months. The second was a 43-year-old woman with no cardiovascular risk factors. She presented with the same clinical case as the first patient. A PCI using a BVS was performed with good clinical outcome but got complicated with an intra-stent restenosis at 6th month follow-up. These were the first PCI using BVS performed in the service or even in sub-Saharan Africa to our knowledge. The stents were MAGMARIS. The procedure followed the guidelines for the use of BVS. Restenosis in the second patient despite well-managed treatment is consistent with data in the literature on BVS, which do not recommend their use outside of clinical trials.

KEYWORDS: Angioplasty, Bioresorbable Vascular Scaffold, MAGMARIS, Dakar.

INTRODUCTION

Several techniques have followed one after another since the advent of percutaneous coronary intervention (PCI). These techniques ranged from balloon angioplasty to bare-metal stent (BMS), drug-eluting stent (DES) and then to bioresorbable scaffold (BRS), the fourth revolution in the history of PCI.[1] The theory of using a BRS is to provide transient support for the vessel and then to be completely resorbed, allowing the vessel to heal and return to a more natural state.[2] This decreases the risk of stent thrombosis, a problem with BMS and DES, and late long-term bad apposition; the BRS would already have undergone complete resorption.

We report two cases of first PCI with BRS performed in the cardiology department of Aristide le Dantec Hospital in April 2018.

OBSERVATIONS

Observation N ° 1

This is a 76-year-old man who had an acute coronary syndrome with permanent ST-segment elevation (STEMI) in anteroseptal territory. He was admitted at Dakar Principal Hospital during 7 days in November 2017, after the thrombolysis delay. His cardiovascular risk factors are age, male gender, physical inactivity and arterial hypertension noticed since several years. He has no diabetes or smoking. The clinical examination during recruitment did not note any particular anomalies.

The electrocardiogram performed before PCI recorded a regular sinus rhythm at 64 cycles per minute, a QRS axis at 50°, a right atrial hypertrophy, a fixed PR at 15/100 s, narrow QRS in all derivations, negative QRS in V1 V2, a not significant elevation of the ST segment in V1-V2-V3 “Figure 1”.

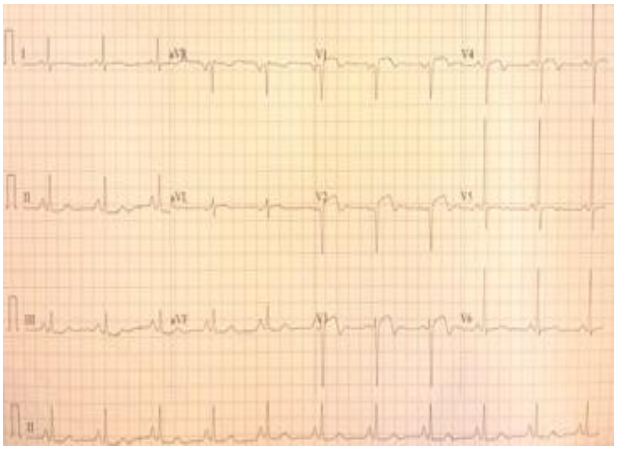

Figure 1: Electrocardiogram showing necrosis at V1, V2 and non-significant ST segment elevation at V1-V2-V3.

The Echocardiography performed in November showed left atrial enlargement, the other cavities were of normal size. Systolic function of the left ventricle (LV) was normal with LV ejection fraction (LVEF) at Simpson Biplan at 55 %, a segmental kinetic disorder with septo-apical, apical and anterior-apical akinesia. The fill pressures of the LV were normal. The right ventricle (RV) has good systolic function, pulmonary arterial systolic pressure (PASP) was normal.

A coronary angiography on February 8, 2018 found a nonsignificant distal plaque of left main coronary artery (LMCA), left anterior descending (lad) artery subocclusion subclamp, diagonal bifurcation lesion, proximal circumflex (Cx) intermediate long lesion, and short tight lesion of the distal circumflex artey, a short intermediate lesion of the right coronary artery (RCA) (elbow CD1-CD2) "Figure 2".

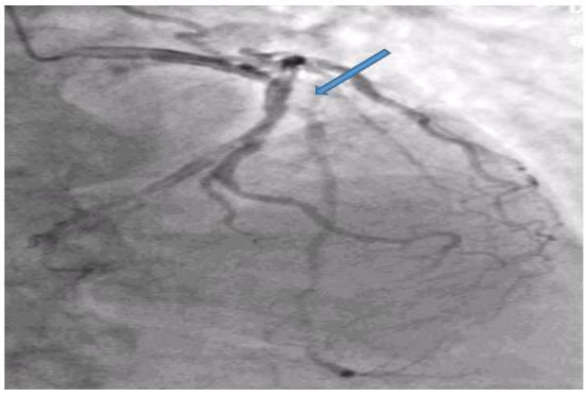

Figure 2: Coronarographic image at 30 ° strict cranial incidence showing subocclusion of the proximal left anterior descending artery (LAD) and the bifurcation lesion with the diagonal.

A myocardial viability in antero-apical territory was observed during the search for myocardial viability carried out after the coronary angiography.

A decision of PCI was decided for this patient. After unclasping the LAD subocclusion with a PILOT 50 guide and a 2.0 x 10 mm POWERLINE balloon followed by predilatation with a 3.0 x 25 mm balloon, a MAGMARIS bioresorbable active stent 3.5 x 25 mm was placed at the IVA lesion, inflated to 14 atmospheres twice for 30 seconds "Figure 3a". An appearance of small stickiness was observed upstream of the stent requiring dilation by a PANTERA 3.5 x 20 mm balloon followed by the placement of a GALEO 0.014 mm guide in the diagonal, and a decision to put 2 active stents upstream of the absorbable stent: an ORSIRO 2.5 x 15 mm inflated to 16 atmospheres and a SYNERGY 3.5 x 8 mm inflated to 20 atmospheres. The final result is excellent "Figure 3b".

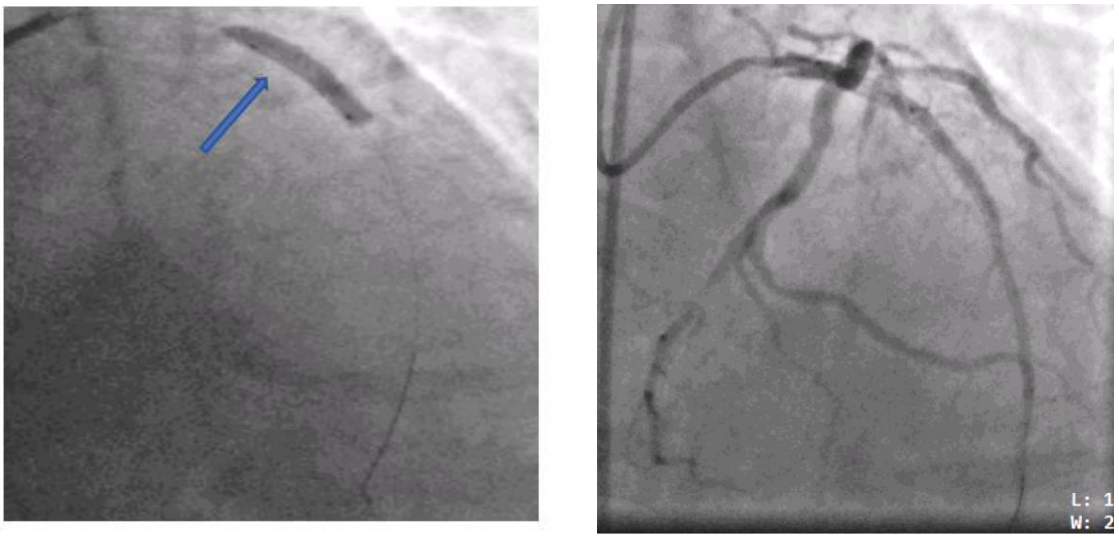

Figure 3a and 3b: Coronary image showing the deployment of the MAGMARIS BRS 3.5 x 25 mm on the proximal LAD lesion (a) and the excellent final result of the LAD PCI (b).

A control angiography was performed after 6 months and found a good result with the absence of in-stent restenosis, but appearance of a tight lesion upstream of the implantation of the BRS "Figure 4".

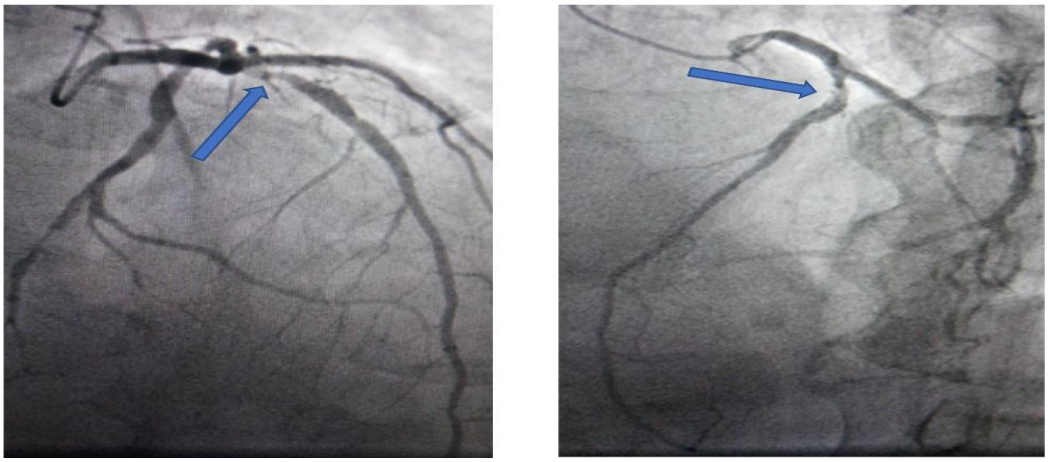

Figure 4: Coronarographic control image at 6 months showing the absence of in-stent restenosis but appearance of a tight stenosis above the implantation position of the bioresorbable scaffold.

OBSERVATION N ° 2

This is a 43-year-old woman without cardiovascular risk factors, who had a STEMI in lateral territory, received after the thrombolysis delay in November 2017. She was admitted for 4 days in Louga. The clinical examination during recruitment did not note any particular anomalies.

The electrocardiogram performed before the procedure recorded a regular sinus rhythm at 60 cycles per minute, a QRS axis at + 70 °, a fixed PR at 15/100 s, narrow QRS in all the derivations, and an antero-septo-apical necrosis "Figure 5".

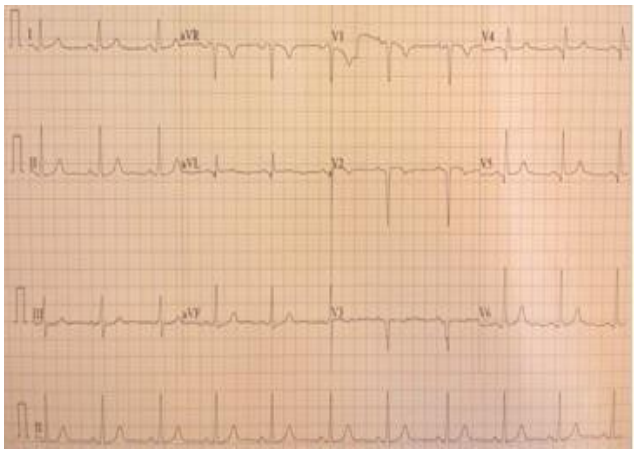

Figure 5: Surface electrocardiogram showing antero-septo-apical necrosis.

Echocardiography found moderately dilated LV, average systolic LV dysfunction with a 40% LVEF at Simpson Biplane, septoapical, inferoapical, antero-apical and apical akinesia, antero-septal and anteromedial hypokinesia. The filling pressures of the LV were normal, as well as the right cavities and PASP.

A coronary angiography performed in February 2018 revealed proximal LAD subocclusion with right coronary resumption "Figure 6".

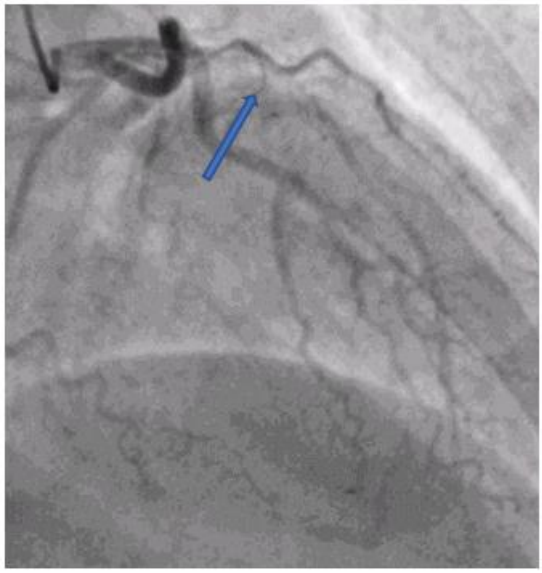

Figure 6: Coronarographic image in cranial incidence (10° AOD, 40° cranial) showing proximal LAD occlusion.

A myocardial viability in antero-septal and anteromedian territories was observed during the search for myocardial viability performed after coronary angiography.

A decision of PCI was made for this patient. After unobstructed subocclusion of the proximal LAD with a 0.014 mm PILOT 50 guide followed by dilatation of the lesion with a 2.5 x 12 mm balloon, an active BRS MAGMARIS 3.0 x 25 mm was placed on the lesion, inflated at 10 atmospheres for 30 seconds then a second time at 16 atmospheres for 30 seconds with an excellent final result "figure 7a and 7b".

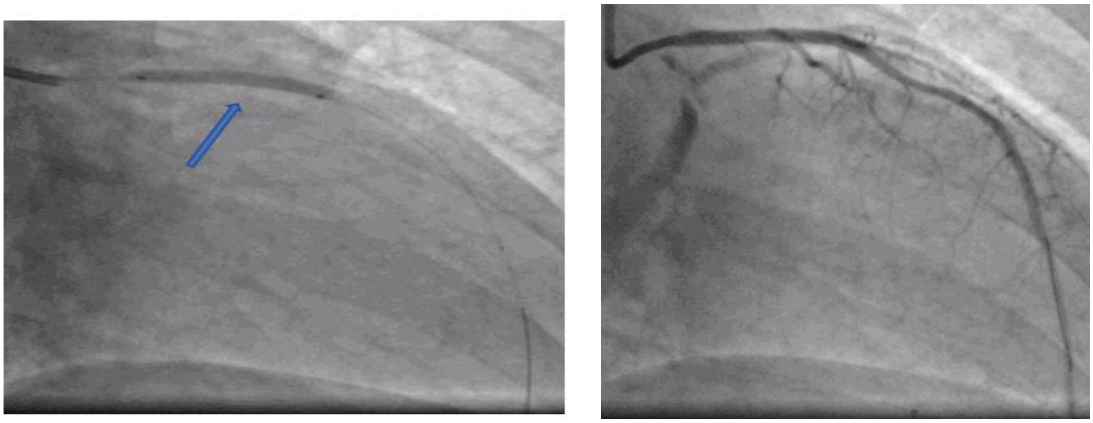

Figure 7a and 7b: Coronary image showing the deployment of the MAGMARIS bioresorbable scaffold 3.5 x 25 mm on the proximal LAD lesion (a) and the excellent end result of the LAD PCI (b).

A control angiography was performed after 6 months and found a significant in-stent restenosis despite the good clinical evolution.

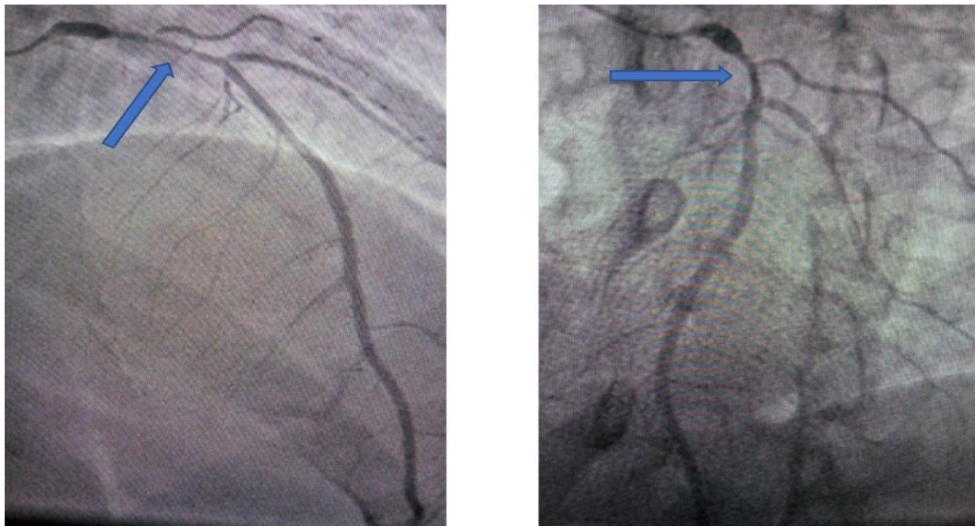

Figure 8: Coronarographic image of control at 6 months showing the appearance of tight in-stent restenosis.

Comments

The bioresorbable scaffold MAGMARIS has a magnesium alloy as a material.[3] Like all other BRS, it ensures a successful complete revascularization,[4] and balancing of the slab,[5,6] as in our series with excellent final results.

Our two patients had each a STEMI that did not have thrombolysis or primary PCI. The first patient has several cardiovascular risk factors including age at 76, while the second is a relatively young 43-year-old patient with no cardiovascular risk factor. Our serie has the same age range as that of Haude M. and Co in the BIOSOLVE II study of the MAGMARIS BRS.[3] Both patients were clinically stable before the procedure. The left ventricular ejection fraction of our series was greater than 30%, and the severity of the lesion was between 50% and 99%. The diameter of the coronary artery of our two patients was 3.5 mm and the length of the lesion was greater than 21 mm.

The presence of myocardial viability led to the decision of revascularization for both cases, thus joining the indication of revascularization according to the data of the literature.[7,8]

The first implementation of IGAKI-TAMAI BRS by Dr Tamai was in 1999.[9] Our serie of April 2018 is the first in Senegal or even in sub-Saharan Africa to our present knowledge. The choice of BRS in our series was taken with the assurance of a good compliance of a dual antiplatelet therapy (DAPT) of at least 6 months, the type of de-novo lesions as well as the systolic LVEF greater than 40%.

Regarding the procedure, the mandatory predilatation of the lesion.[3] was respected in both patients. A DAPT of at least 6 months was prescribed after the procedure.

Regular follow-up was done for our two patients including a control coronarography at 6 months. The first patient did not have an in-stent restenosis but a new tight

lesion prior to the apposition of the BRS. The second patient, on the other hand, presented a long in-stent restenosis although asymptomatic.

The new European recommendation on myocardial revascularization appeared in August 2018, 4 months after the beginning of our study, and classified in class III, ie non-recommended, the use of the BRS for PCI except in clinical studies.[10]

CONCLUSION

Revascularization with a bioresorbable scaffold is a progress in interventional cardiology. In addition to their shared characteristics with other active stents, bioresorbable scaffold have the property of being resorbed after few months of implantation allowing the coronary artery to regain its motor function. The first BRS were put in the late 1990s in developed countries. Our serie is, to our knowledge, the first cases of this technique in sub-Saharan Africa. But the result was not satisfactory. Indeed, the absence of superior evidence of efficacy compared to thedrug-eluting stents, after follow-ups up to 5 years, is the reason for the non-recommendation of the use of bioresorbable scaffolds in current practice according to the European recommendations for myocardial revascularization.

CONFLICT OF INTEREST: The authors declare that they have no conflict of interest.

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