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REVIEW

Magic Touch®: preliminary clinical evidence with a novel sirolimus drug coated balloon

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ABSTRACT

Drug-coated balloons (DCB) have been developed in recent years to overcome some of the drug-eluting stents limitations. There is an established indication for the use of DCB in the treatment of in-stent restenosis and they are also variably used in various setting, in particular small coronary vessels and bifurcations. Until 2016, all DCBs available in Europe eluted paclitaxel, a highly lipophilic drug with narrow therapeutic window. In April 2016 a new sirolimus-coated balloon (Magic Touch®, Envision Scientific PVT, Bhatpore, India) obtained the CE Mark. This device shares a new-generation delivery system and is able to release in a few seconds an effective dosage of sirolimus.

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Drug-coated balloons (DCB) have been developed in recent years to overcome some of the drug-eluting stents (DES) limitations.[1] Their goal is to provide mechanical expansion of the stenosis, combined with the release of an antiproliferative drug, avoiding the release of a foreign body. There is an established indication for the use of DCB in the treatment of in-stent restenosis [2] and they are also variably used for the treatment of small coronary vessels and bifurcations.[3-6] Until 2016, all DCBs available in Europe eluted paclitaxel, a highly lipophilic drug with narrow therapeutic window.

In April 2016 a new sirolimus-coated balloon ([SCB], Magic Touch®, Envision Scientific PVT, India), obtained the CE Mark. This device shares a new-generation delivery system and is able to release in a few seconds an effective dosage of sirolimus.

Brief history of DCBs

Nowadays DES are considered the gold standard treatment for percutaneous coronary revascularization.[7, 8] Whilst new-generation DESs have shown powerful antiproliferative properties and excellent long-term results, their use still faces some limitations, in particular in case of treatment of certain anatomical settings (small vessels, bifurcations). This is due and the increased risk of bleeding associated with the need for prolonged dual antiplatelet therapy, and the risk of very late stent thrombosis, a risk that never ceases.[9, 10]

To overcome some of these limitations, DCBs have been introduced and later developed in recent years; these balloons share a variable degree of compliance and are covered with an antiproliferative drug that is rap-

idly released when in contact with the vessel wall.

DCBs first appeared in the European market in 2007, with the aim of offering a combined therapy, both mechanical (the balloon dilatation) and biological (ensured by the drug release in the vessel wall), thus avoiding the implantation of a permanent prosthesis. From the technical point of view, DCBs are designed to deliver the antiproliferative drug, not to treat the stenosis; therefore, in order to achieve a good result, the lesion must be adequately pretreated. Then, a prolonged inflation of the device is required (30-120 seconds depending on the device) which allows an adequate transfer of the drug to the vessel wall.[11]

Compared to DES, DCBs provide a wider contact surface, allowing a more homogeneous transfer of the drug to the vessel wall; furthermore, the lack of a permanent prosthesis favors the restoration of a regular vasomotricity, allowing for a reduction of the duration of dual antiplatelet therapy. In this way, the mechanical expansion of the vessel is combined with the release of an antiproliferative drug, which starting from the *tunica intima* of the vessel wall, will reach the *tunica media* and *tunica adventitia*, where its antiproliferative effect will take place. This "journey" usually occurs in the first 2-4 weeks after drug deployment.[1, 12]

Historically, in-stent restenosis (ISR) was the first application for DCB, an indication for which we have now a consistent scientific literature. Currently, European guidelines suggest the use of DCB for the treatment of ISR, providing this technology with I class indication, level of evidence A, similarly to DES.[2-4]

In 2006, the PACCOCATH-ISR [13] was the first trial to demonstrate the superiority of DCB (PACCOCATH®, Bayer AG, Leverkusen, Germany) compared to old plain balloon (POBA) for the treatment of BMS restenosis, which was also confirmed at a follow-up of 5 years.[14] After this study, the PEPCAD II Trial demonstrated the superiority of DCB (SeQuent Please®, B. Braun, Melsungen, Germany) compared to paclitaxel-eluting DES, in the treatment of BMS ISR.[15] The non-inferiority of the SeQuent Please to DES, was also demonstrated for the treatment of DES ISR, in the ISAR-DESIRE III Trial,[16] with the efficacy and safety of DCB confirmed at 3-year follow-up.[17]

Fewer evidences and more contrasting data are available for the use of DCB *versus* second generation DES. The RIBS V randomized Trial [18] showed an equivalent clinical outcome at one-year follow-up for both the SeQuent Please DCB and the everolimus-eluting DES (EES) (Xience, Abbott Vascular, Abbott Park, IL, USA) for the treatment of BMS-ISR. At angiographic follow-up, however, patients in the EES arm showed a significantly higher minimum luminal diameter (MLD), compared to DCB.

The RIBS IV randomized clinical Trial,[19] investigated the efficacy of the SeQuent Please DCB for the treatment of the DES-ISR and demonstrated the superiority of EES, both in terms of angiographic and clinical results, mainly driven by a significant reduction in the rate of TLR. During the angiographic follow-up at 9 months patients in the EES arm had a significantly larger minimal lumen diameter (2.03±0.7 mm *vs*. 1.80±0.6 mm; P<0.01), with an absolute mean difference of 0.23 mm (95% CI: 0.07 to 0.38), an improved net lumen gain (1.28±0.7 mm *vs*. 1.01±0.7 mm; P<0.01), a lower percent diameter stenosis (23±22% *vs*. 30±22%; P<0.01) and binary restenosis rate (11% *vs*. 19%; P=0.06), when compared to the DCB arm. After 1 year, clinical follow-up was obtained for all the patients: the composite endpoint of cardiac death, myocardial infarction, and target vessel revascularization was significantly lower in the EES arm (10% *vs*. 18%; P=0.04; HR: 0.58; 95% CI: 0.35 to 0.98). This item was mainly driven by the lower need for TVR (8% *vs*. 16%; P=0.035).

Conversely, Pleva *et al.* compared the efficacy of SeQuent Please® DCB with EES for the treatment of BMS-ISR; at the 12-month angiographic follow-up the late lumen loss (LLL), primary endpoint of the study, was significantly lower in the DCB arm than in the EES group.[20]

Recently Baan *et al.* in the DARE Trial en-

rolled 278 patients with ISR (either of BMS or DES), that were randomized to Sequent Please DCB or EES. The primary endpoint of non-inferiority of in-segment MLD during 6 month follow up was met, with 1.71±0.51 mm in the DCB arm *vs*. 1.74±0.61 mm in the EES arm, P for noninferiority <0.0001). Also TVR was similar in the 2 arms (respectively 8.8% *vs*. 7.1%, P=0.65).[21]

Conversely, DCBs have been increasingly used for the treatment of *de novo* coronary lesions, at least in selected anatomical settings, such as small vessel disease and bifurcation lesions;[3, 4, 6, 12] in these settings, for different reasons, the use of DES has not showed always a good outcome, therefore different therapeutic alternatives are of particular interest. In small vessels, the physical encumbrance of the prosthesis reduces an already naturally narrow lumen, and the risk of restenosis or re-occlusion is higher than in large-caliber vessels, also because patients which suffer small vessel disease are often diabetic. Moreover, the treatment of restenosis in this setting can be particularly challenging.

Literature on the subject is discordant, both for an initial inexperience during the first years with DCB (*e.g.*, inadequate lesion preparation) and a consistent difference between the devices used.[22-24]

The PEPCAD I (Paclitaxel-Eluting PTCA-Balloon Catheter to Treat Small Vessel Coronary Artery Disease) was the first study using a DCB-only strategy in this particular setting.[25] The device used was a SeQuent Please. An intention-to-treat analysis showed MACE at 15.3% after 12 months in the DCB arm, but a per-protocol analysis indicated better outcomes, both clinically and angiographically, in favor of the DCB-only strategy, with a TLR rate of 5% in the DCB-only group and 28% in the DCB + BMS group. After a 3-year follow-up period, no additional MACE were observed in both groups, suggesting that after the first 6 months, lesions could be considered stabilized.[26]

The PICCOLETO [23] randomized trial compared an early-generation DCB (DIOR I) with paclitaxel-eluting DES in small vessels (<2.75 mm), but was prematurely discontinued as a result of superior results in the paclitaxel-eluting DES arm; this results might be related to the scarce efficacy of the device, a first generation DCB, and the low-rate of predilatation in the DCB arm (25%).

Recently Her *et al.*[27] compared the angiographic efficacy of SeQuent Please DCB with POBA for the treatment of *de novo* lesions in vessels with a diameter between 2.5 and 3.0 mm and lesion length ≤24 mm; in the DCB arm, the 9-month angiographic and clinical outcome resulted improved in terms of LLL (-0.12±0.30 mm *vs*. 0.25±0.50 mm, P<0.001), binary restenosis (4.1% *vs*. 30.4%, P<0.001) and target vessel revascularization (TVR) (0% *vs*. 13%, P=0.033).

Several studies in the *de novo* lesion in small vessels setting are currently undergoing: interestingly the RAMSES Trial (ClinicalTrials.gov Identifier: NCT01722799) will compare new generation zotarolimus-eluting DES with paclitaxel DCB (IN.PACT FALCON, Medtronic, Minneapolis, MN, USA). The primary endpoint is TVR, while the secondary is a cost-effectiveness analysis of DCBs *vs*. DES, in patients with *de novo* lesions in small vessels.

Of note, recently our group with the DCB-RISE Registry,[28] a multicentric, retrospective registry of patients with both ISR and *de novo* lesions treated with Elutax SV DCB (Aachen Resonance, Aachen, Germany), showed good procedural success in both the ISR and de novo subgroups, and a significantly lower rate of TLR in patients treated for de novo lesions at mid-term clinical follow up.

Bifurcations are complex lesions, often associated with a higher rate of restenosis and stent thrombosis; for this reason a DCB may be an attractive alternative.[29] In the treatment of bifurcations, the provisional stenting technique proved to be superior compared to the two-stent technique; in this setting it appears of interest to treat the collateral branch with DCB. Also in this case, though, trials with first-generation DCBs led to unsatisfying results.[30]

More recently, the BABILON Trial [31] compared two different strategies: EES in the main

branch followed by angioplasty and provisional stenting in the collateral branch *vs*. DCB SeQuent Please in the main and side branches, followed by BMS in the main branch. In terms of LLL, the use of DES in the main branch was superior to the strategy with DCB followed by BMS. In the collateral branch, the LLL was similar in the case of DCB or angioplasty with a simple balloon.

Despite some not univocal results, Kleber [32] first demonstrated the ability of DCB to increase luminal dimensions when used for treating *de novo* lesions; postprocedural QCA data compared with data obtained after 4 months showed a significantly higher MLD at follow-up with an improved degree of stenosis; this was not obtained in the historical control group treated with POBA. Moreover, these data were also confirmed in our patients in 2 different studies.[33, 34]

Data on residual dissections after DCB angioplasty for *de novo* lesions are also very interesting; our group,[34] in a consecutive series of patients treated with one of the latest generation DCB (Elutax SV, Aachen Resonance, Germany), and left with an unsealed, not flow-limiting dissection, showed a high rate of dissection healing at 6-month follow-up (93.8%), with only 3 cases of binary restenosis (6.2%) and no thrombotic events. These results confirmed that leaving low-mid grade dissections (types A-C) after angioplasty with one of the latest generation DCB is safe and not associated with an increased risk of thrombosis, myocardial infarction or revascularization of the target lesion.

Why sirolimus? Some technical insights

Until 2016 all DCBs marketed in Europe eluted paclitaxel due to its favorable pharmacokinetic properties. Paclitaxel is a lipophilic drug that rapidly crosses the cell membrane and binds to microtubules, thus inhibiting cell division and migration, and therefore cell proliferation.[1, 35, 36]

The drug dosage is little variable, ranging between 2-3.5 mcg/mm^2 of inflated balloon surface. The coating (matrix or carrier) of the balloon is fundamental, because it must be able to hold the drug during the transit across the proximal vessel and the lesion itself, and should ensure a rapid and homogeneous transfer to the vessel wall during inflation, reducing the risk of dispersion.[37] However, the overall efficacy of the DCB has been sometimes questioned, especially for one of the following items: the absence of futility of the drug carrier, or the limited therapeutic window of paclitaxel.

Conversely, currently available DES all elute sirolimus or analogue drugs (the "-limus" drug class) due to the improved outcome shown when compared to paclitaxel-eluting stents, that were abandoned a few years ago due to reduced efficacy and a possible increased risk in thrombotic complications. Despite no specific issues were raised for currently available paclitaxel-eluting DCB, sirolimus has well recognized antiproliferative properties and a wider therapeutic window. The main issue with sirolimus was to overcome its low lipophilia, that could hamper its penetration in the vessel wall.

The Magic Touch® released in Europe in 2016 is a SCB with a latest-generation monorail delivery system compatible with 5-Fr guiding catheters (Figure 1). The low-profile distal tip and the rigid hypotube, along with the technique of drug deposition, allows a high deliverability and trackability of the device. The balloon is coated with sirolimus in a uniform manner through the use of a spray coating (Figure 2). The technology specifically de-

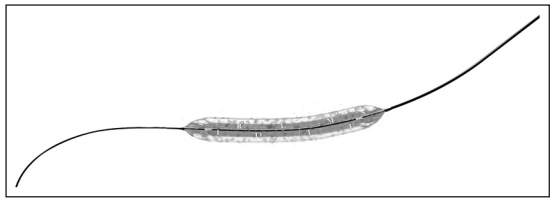

Figure 1.—The Magic Touch® device.

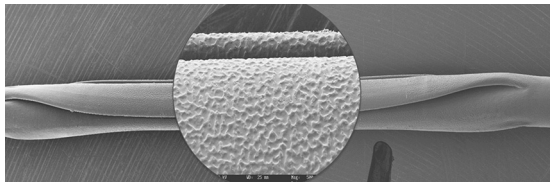

Figure 2.—Scanning Electron Microscope image of the device.

signed for this device (Nanolutè®) consists in the encapsulation of sirolimus in a protective lipophilic package, which allows drug diffusion and penetration into the arterial wall during balloon inflation, overcoming the low lipophilicity of sirolimus. This package consists of nanospheres of 100-300 nm diameter. The total dosage of the drug corresponds to 1.25 mg/mm^2 of surface of the balloon, well within the therapeutic window of sirolimus.

Animal studies have shown that only 10% of the drug is lost in transit, then about 56% is released with the first balloon inflation, which should last 40-60 seconds; an additional 20% of the drug may be administered with an eventual 2nd inflation, while only 14% remains on the balloon. The overall performance of this device is high.

The blood concentration reaches its peak within the following 30 minutes, and then disappears within 24 hours, while the tissue concentration is still detectable after 14 days. The drug persists on the vessel wall after the balloon inflation for 15-30 days; basically, the pharmacokinetic properties of this SCB reflect the one of latest-generation paclitaxel-coated balloons [38, 39](Figures 3, 4).

Clever *et al.*[40] studied different sirolimus coating formulations and doses in a porcine coronary model; sirolimus tissue levels were measured at different time points, and the efficacy at 1 month was evaluated, by the means of quantitative coronary angiography and histomorphometry. They concluded that different SCB while effectively reduced neointimal proliferation in the porcine coronary model, greatly differ in drug-retention time in the vessel wall, with no observable relevant clinical effect for formulations with persistent high vessel drug concentration.

In our experience, the device has shown an high deliverability and trackability in extremely calcific vessels as we could prove in this case of a 67 years old patient, with a very complex lesion of the right coronary artery (RCA) (Figure 5). The patient, hypertensive and diabetic, underwent an aortic valve replacement and CABG one year before, and was admitted at our institution for stable angina with a positive stress test. Coronary angiography showed a long and severe calcific lesion of the RCA (Figure 5A). The first step was adequate lesion preparation with rotational atherectomy (Figure 5B) and aggressive predilatation with different balloons of increasing diameters. After predilatation angiography showed multiple dissections in the proximal and mid part (Figure 5C). Since it was impossible to properly predilate the proximal segment, and it was too risky delivering a stent, we decided for a hybrid DCB+DES approach. Two DES were implanted in the mid and distal RCA (Figure 5D), while the proximal lesion was treated with sole SCB angioplasty, with a good final result (Figure 5E). The angiographic follow-up at 4 months showed persistence of a good result (Figure 5F), confirming the safety and efficacy of this device in such a complex case, in a segment where stent deployment could have resulted in under-expansion, thus increasing the risk of late adverse events.

Recently the SABRE Trial [41]was the first in-

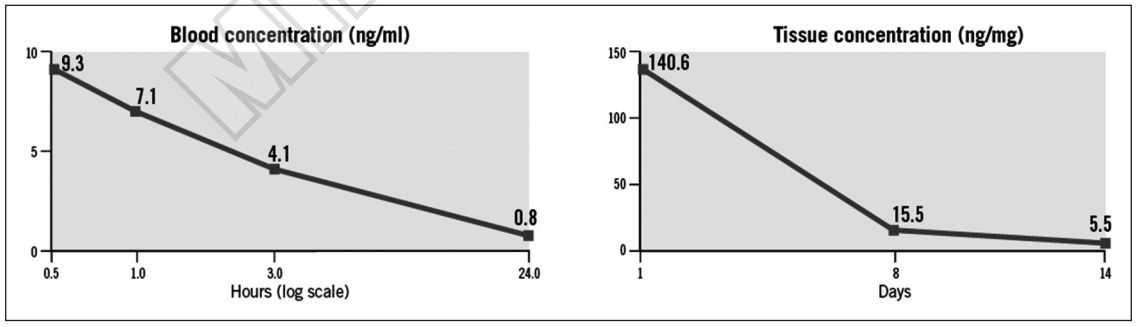

Figure 3.—Blood concentration (left) and tissue concentration (right) of sirolimus after a single 60-second inflation of the nanocarrier sirolimus-eluting balloon; permissions obtained from Lemos *et al.*[38]

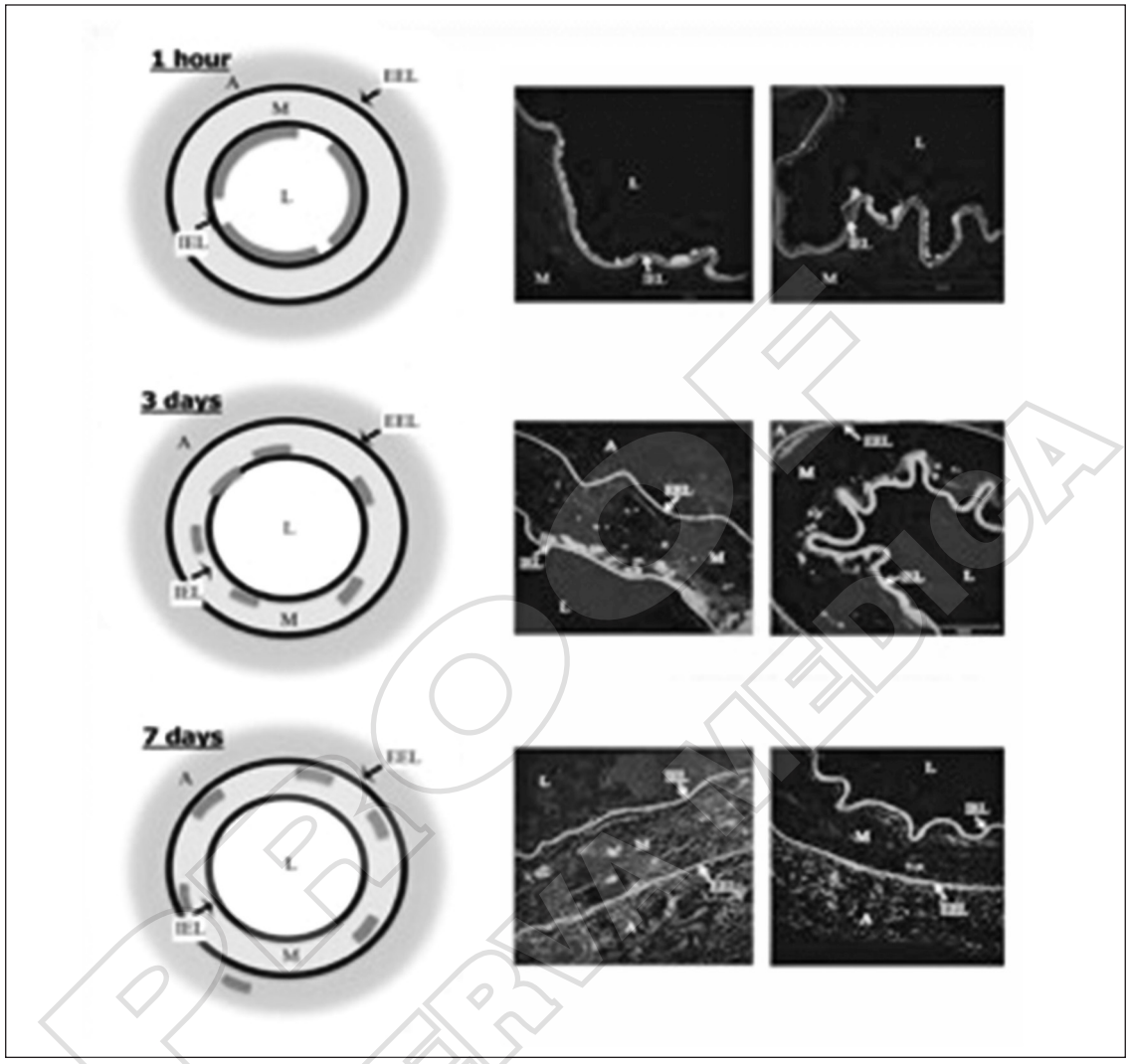

Figure 4.—Fate of sirolimus after deployment with Magic Touch®, at 1 hour (tunica intima), 3 days (tunica media) and 7 days (approaching external elastic lamina and tunica adventitia); permissions obtained from Lemos *et al.*[38]

human study to assess the safety and efficacy of the new Virtue SCB (Caliber Therapeutics, New Hope, Pennsylvania) in patients with ISR; patients underwent an angiographic follow-up at 6 months and were followed clinically up to 1 year. Procedural success was 100%. The primary safety endpoint of target lesion failure (TLF) (cardiac death, target vessel myocardial infarction, and clinically driven target lesion revascularization) assessed at 30 days was 0%, LLL at 6 months was 0.31±0.52 mm, showing good procedural success and LLL rates in line with current DCB.

The Nanolutè Registry

Being a recent device, only few clinical data are available for SCB use in PCI. The first ever experience was performed in India where the Nanolutè postmarket Registry has been created in order to collect primary clinical data on SCB.[42-44] The study enrolled an all-comer patient population of 332 patients (356 lesions) treated between July 2012 and September 2015, including patients with in-stent restenosis, small vessel and multi-vessel disease, bifurcation lesions. Diabetic patients, old pa-

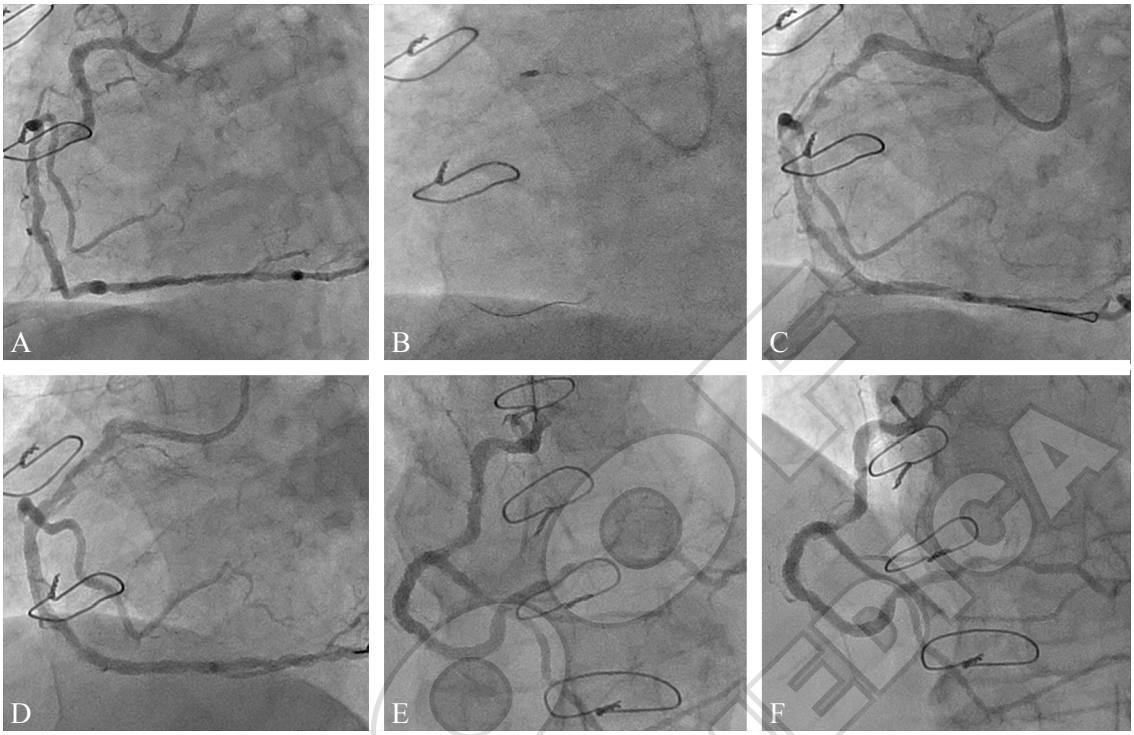

Figure 5.—Management of a highly complex, calcific lesion of the right coronary artery (RCA) (A). First step was lesion preparation with rotational atherectomy (B) and aggressive predilatation. After predilatation angiography showed multiple dissections in the proximal and mid part of the coronary artery (C). Two DES were implanted in the mid and distal RCA (D), while the proximal lesion was treated with sole SCB angioplasty, with a good final result (E). The angiographic follow-up at 4 months showed persistence of a good result (F).

tients and complex clinical scenarios were also included. Procedural success and device-oriented adverse cardiac events (DOCE, defined as a composite of cardiac death, TLR and target vessel MI) at 12-monts, both coprimary endpoints of the registry, were respectively 99.7% and 4.2%. This is indeed the first study which evaluates the feasibility and safety of PCI with a novel SCB. The main findings of the Nanoluté Registry were the good immediate performance of this device and an overall low rate of adverse events at mid-term follow-up; the DOCE rate was mainly driven by TLR, whose rates were more than acceptable considering that about half of the patients were admitted for ISR during index procedure. Of note, no vessel thrombosis was recorded during follow-up. DAPT duration was prescribed for up to 6-months (1 month in case of DCB-only PCI).

These data of TLR are comparable with the ones obtained by the paclitaxel-eluting balloons in other registries (2.9% at 7.5 months of the Valentines II Trial [45] and 5.2% at 12 of the Sequent Please World Wide Registry).[46]

The FASICO Registry

The first experience with SCB in Europe was made at our center after the first Western World implantation, and has been presented and described in the FASICO (FAtebenefratelli SIrolimus COated-balloon) Registry.[47] This is a prospective single-center study of the first consecutive patients, which had at least one lesion treated with SCB between April and July 2016. The aim of the study was to demonstrate the acute performance and the 6-month efficacy and safety of this device in a real world, complex population, including acute coronary syndromes, ISR (around half of the population), long lesions and calcified vessels. The only exclusion criteria were vessel dimensions

that exceeded those of the device tested, and those cases where we opted for another treatment strategy. Despite the small population included (32 patients with 34 lesions) the results were encouraging, demonstrating the safety and efficacy of SCB at short and mid-term follow-up. The primary study endpoint, procedural success, was obtained in 100% of the cases having observed no in-hospital complications. The coprimary endpoint, rate of major adverse cardiac events (MACE), a sum of cardiac death, myocardial infarction-MI, TLR at 6-months, occurred in 3 patients during the follow up (6.9±1.7 months). We observed no cases of death or MI, and 3 cases of TLR which occurred in 3 patients with restenosis, where a strategy second-generation DES (2 cases) or PCB (1 case) had already failed. In particular one of these patients suffered from unstable angina after 3-months and the TLR was caused by recurrent ISR of a BMS, where previous attempts with DES and paclitaxel-eluting DCB had failed. The OCT analysis showed severe underexpansion of the previous implanted DES. Another patient experienced the recurrence of unstable angina 2-months after the index procedure for a critical restenosis of a DES restenosis, and was managed with a new angioplasty, this time with a paclitaxel-eluting DCB. The third patients had a non-ID-TLR due to a chronic total occlusion of a previously implanted DES. Of note, no adverse events were observed in patients treated for *de novo* lesions or BMS restenosis. Interestingly, in 34% of the cases the high complexity of the lesions treated (Medina type 1,1,1 bifurcations, proliferative ISR) required a hybrid approach with DES+SCB. Additional stent implantation at the same site of SCB use occurred in 3 cases (8.8%) because of resulting flow-limiting dissection.

As shown by these 2 preliminary studies, and differently from other previous technologies,[1] the technical properties of this device allow the treatment of complex coronary lesions (tortuous vessels, calcific lesions, …) with high procedural success. In fact, the deliverability and trackability of the current device are at top level.

The EASTBOURNE Registry

After the encouraging results of the FASICO Registry,[47] we designed the EASTBOURNE Study, to extensively document the performance of this device in a wider clinical setting, a wider population and a larger number of catheterization laboratories in Europe and Asia.

The aim of this study was to evaluate the performance of the Magic Touch® SCB in terms of efficacy and safety when used in a real world population, for a broad spectrum of coronary lesions, including native vessel disease and ISR.

The EASTBOURNE is a prospective, spontaneous, multicenter, single arm, interventional study, in which all patients with coronary artery disease and clinical indication for coronary angioplasty, and treated consecutively with SCB, will be enrolled. We plan to enroll a total of 1000 patients at 30-40 international sites, with certified expertise in DCB use.

Similarly to other registries on DCB, the primary endpoint of the study is TLR at a 12 months clinical follow-up.

Secondary endpoints are:

— angiographic success, defined as residual stenosis <50% and final TIMI flow 3;

— procedural success, defined as angiographic success in absence of cardiovascular adverse events during hospitalization;

— major cardiovascular adverse events (MACE), a composite endpoint of cardiac death, acute myocardial infarction and TLR at 6, 12 and 24 months from implantation

— every single component of MACE.

The inclusion criteria are broad: every patient >18 years, with a clinical indication for PCI, can be enrolled.

Patients cannot be enrolled in case of:

— known hypersensitivity or contraindication to Aspirin, Heparin, Clopidogrel, Prasugrel, Ticagrelor, Sirolimus or contrast media, which cannot be adequately premedicated;

— target lesion/vessel that cannot be successfully predilated (residual stenosis >50%), a severe calcification of the target vessel, also proximal to the lesion, highly tortuous lesions;

— visible thrombus at lesion site, not treatable with any type of thrombus aspiration.

After enrolment, the procedure will consist of normal coronary angioplasty as per international guidelines and following the GISE position document on the optimal use of DCB.[11, 48] Before DCB use, it is mandatory to adequately predilate the lesion with a semi-compliant or non-compliant balloon; the DCB inflation should be of at least 30 seconds, possibly 60 seconds if tolerated by the patient. Any decision to implant a stent as bail-out is left to the discretion of the operator, but we encourage to limit it only in case of residual dissection ≥type C and in the presence of coronary TIMI flow <3.

After the angioplasty, patients will be given aspirin indefinitely (100 mg per day) and clopidogrel (75 mg per day) or prasugrel (10 mg per day) or ticagrelor (90 mg x 2 times per day) for 1 month (3 months in case of further stent implantation after DCB). In case of different judgement of the operator or in case of acute coronary syndrome at admission, dual antiplatelet treatment can be prolonged.

Per protocol, all patients enrolled will be observed, after the initial visit, for a period of 24 months, including a visit at 30±7 days, 6±1 months, 12±1 months and 24±1 months after intervention.

So far, nearly half of the planned patients have been enrolled in the EASTBOURNE Registry. In December 2017 we performed an interim analysis whose aim was to test the safety and the efficacy of the device at short term follow up. The clinical presentation was an acute coronary syndrome in 40% of patients. Forty-five % of the lesions treated were type B2-C, with *de novo* and ISR lesion equally represented (50% each). In 49% of the cases the patient underwent multivessel PCI. Stent use at lesion site was low according to protocol suggestions (9%).

The Magic Touch® showed to be highly effective in this all-comer population with an angiographic success of 98%. The 1-month clinical follow up is available for 280 patients and shows a good safety and efficacy profile. However, these data are blinded and cannot be disclosed here.

These preliminary data confirm the high immediate technical performance and mid-term safety of this device.

Future studies on the pipeline

Currently, data on SCB are not robust yet, and it is our opinion, before suggesting the broad use of this device, that we have to test it more deeply in some specific settings. Awaiting the first robust clinical data that we will obtain from the EASTBOURNE Registry, we are going to understand the performance of this device in some mechanistic studies.

Preliminary QCA data are available for native vessel disease. Our series of patients treated with SCB for small vessel disease were analyzed by an independent core lab (Cardialysis, Rotterdam, The Netherlands) and showed a negative LLL after 6 months (N.=14, LLL -0.05±0.51). These data will be presented in 2018 during major interventional cardiology meetings, and published later.

We are also designing 2 more studies:

— a direct comparison with the currently mostly studied and used DCB worldwide, by means of randomized allocation, in the setting of de novo lesions in small coronary vessels (<2.5 mm). This study will test the hypothesis of non-inferiority of the 2 devices and will enroll 110 patients at 4-6 European laboratories and will also have an optical-coherence tomography sub-analysis;

— a direct comparison with the current best-in-class and mostly used DES, Xience, in a randomized controlled study in a similar setting (de novo lesions in small coronary vessels <2.75 mm). This study will enroll 180 patients at 6 European/south American centers. The non-inferiority of the 2 devices is hypothesized.

Conclusions

Despite the presence of devices with debatable efficacy, the DCB market is growing yearly in Europe because of an undisputed safety profile of some of these devices, also counting on the well-known caveats of DES and the

drop in bioresorbable scaffold use after the drawback of Absorb® (Abbott Vascular, USA). However, much more can be made in terms of bulding-up a reliable clinical program.

Magic Touch® SCB is the first sirolimus-coated balloon that merges a new delivery system to a specific technology that helps delivering the drug to the vessel wall. The preliminary clinical and angiographic data of this device are promising, and further researches are ongoing.

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