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INSIDE

Review of

EuroPCR 2018

Paris, France

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"It is with great pride that I introduce to you the most recent edition of EMJ Interventional Cardiology, focussing solely on EuroPCR... "

Spencer Gore, CEO

Editorial Board

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Aims and Scope

The European Medical Journal (EMJ) is an online only, peer-reviewed, open access general journal, targeted towards readers in the medical sciences. We aim to make all our articles accessible to readers from any medical discipline.

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EMJ aims to support healthcare professionals in continuously developing their knowledge, effectiveness, and productivity. The editorial policy is designed to encourage discussion among this peer group.

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EMJ Int Cardiol.

EMJ Hepatology 6.1

This impressive eJournal marks the European Medical Journal's third specialist publication to be released this year, following the success of *EMJ Innovations 2.1* and *EMJ Urology 6.1*.

VIEW ALL JOURNALS ←

Welcome

It is with great pride that I introduce to you the most recent edition of *EMJ Interventional Cardiology*, focussing solely on EuroPCR, the official meeting of the European Association of Percutaneous Cardiovascular Interventions (EAPCI), the world-leading course in interventional cardiovascular medicine. The team here at EMJ is extremely proud to have created such a unique summary of one of Europe's most prestigious events.

EuroPCR 2018 proved to be, as ever, a great success, with almost 11,000 participants in attendance in Paris, France. The opportunities available to delegates were outstanding, including gripping live sessions streamed directly from operating theatres across the globe, as well as the presentation of many prestigious awards, which are summarised for you in the Congress Awards section. Statements on chronic coronary syndromes and results of the ORBITA, SYNTAX III, and SPYRAL HTN-ON MED trials were also discussed in great detail at this year's event, and therefore have pride of place in our Congress Review. Lessons from great innovators of the past are highly significant in this modern discipline, so be sure to also turn to the Congress History section of this one-of-a-kind eJournal.

With a range of research on display throughout the 4-day event, the Abstract Reviews section provides a snapshot of the fantastic work presented at this year's EuroPCR. Our hand-selected collection of abstract summaries includes topics such as segment elevation myocardial infarction (STEMI), chronic total occlusion, and fractional flow reserve, in addition to a captivating case of transcatheter aortic valve implantation in extremely low coronary arteries. For those of you looking for more personal insights into this year's congress, *EMJ Interventional Cardiology* Editorial Board member Dr Pablo Sepúlveda Varela kindly shared his opinions and thoughts with us directly from the congress itself. Also, new for this edition, the Congress Diary provides a useful summary of a day at congress, with helpful tips for those of you who have not yet had the pleasure of attending EuroPCR.

As I am sure you will agree, the wide range of content within *EMJ Interventional Cardiology 6.1* is a welcome treat for those of you interested in learning more about EuroPCR or wishing to re-live the highlights of the event. Suitable for established professionals and upcoming interventionalists, there is something for everyone to take pleasure in. Thank you to all those who have contributed and made this edition such a great success.

Spencer Gore

Chief Executive Officer, European Medical Group

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Foreword

Dear Colleagues,

It is my great pleasure to welcome you to this very special edition of *EMJ Interventional Cardiology.* I am proud to present you with the first EMJ publication dedicated solely to EuroPCR, recently held in stunning Paris, France. This issue will provide those of you unable to attend this year's stellar congress with a detailed review of the latest updates and key developments in interventional cardiology, including those presented at this year's meeting.

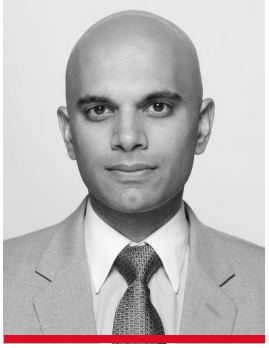
This first-of-its-kind edition of *EMJ Interventional Cardiology* collates many of the fascinating news stories and late-breaking clinical trial results from the congress. A major highlight is the SYNTAX III trial, which scrutinised the decision-making process we as physicians undertake when recommending revascularisation options, with an intriguing comparison of treatment plans suggested by heart teams using different coronary assessment technologies. Also in this issue, coronary physiology is highlighted with the results of a recent trial that considered the effectiveness of fractional flow reserve (FFR)-guided percutaneous coronary intervention (PCI) for the treatment of stable coronary lesions. These are just two of many fascinating stories on offer in this comprehensive review.

This issue also contains summaries of a hand-picked selection of the very best abstracts presented over the 4-day event, penned by the presenting authors themselves. The Abstract Reviews section captures not only the fascinating details within each featured study, but also offers an insight into the breadth of ongoing research that will revolutionise interventional cardiology in the near future.

Alongside this, the EMJ reporting team has been hard at work developing a range of new content for you to enjoy. Of particular note is the Reporter's Diary, which presents a fresh and unique perspective on congress that can be used to guide those of you who are new to EuroPCR. Finally, we feature a journey through the history of interventional cardiology, revealing the role that the discipline has played at the forefront of medical innovation and in which we find inspiration to aim higher and strive to optimise the care we deliver to our patients.

On behalf of the *EMJ Interventional Cardiology* Editorial Board, I would like to thank all of the contributors involved in the production of this publication. I am sure that you will find the captivating content as informative and enjoyable as we did.

Kind regards,



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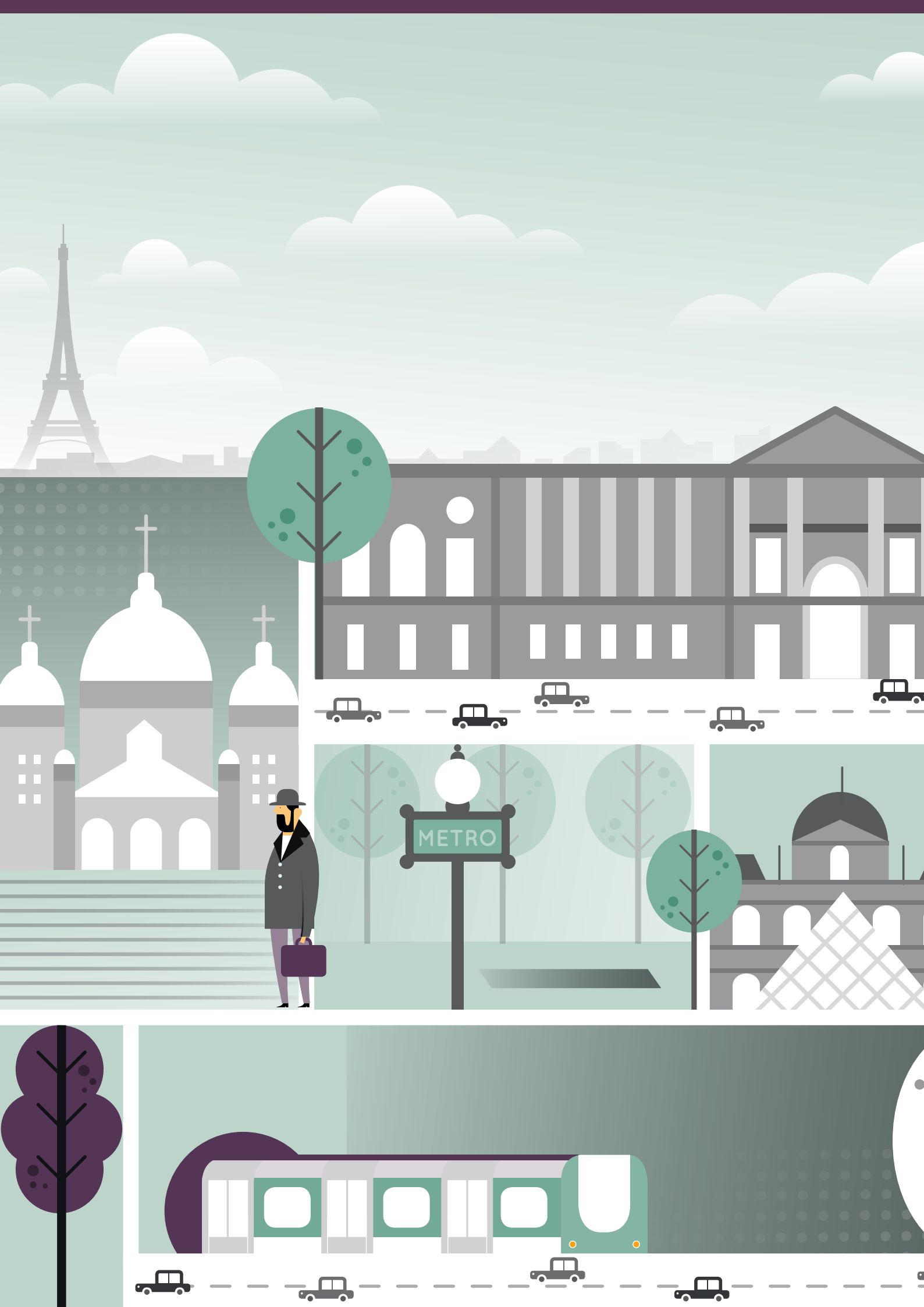
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Congress Review

Hello and welcome to the European Medical Journal's review of EuroPCR 2018

Location: Paris, France – Palais des Congrès

Date: 22.05.18–25.05.18

Citation: EMJ Int Cardiol. 2018;6[1]:10-22. Congress Review.

Nearly 11,000 participants from all over the world arrived at the heart of Paris, France for EuroPCR 2018. Torrential rain failed to put a dampener on the event, and the burgeoning storm outside was matched by the electric atmosphere crackling within the Palais des Congrès.

A myriad of opportunities were waiting to be seized from the outset of this inimitable event. In front of a packed audience inside the Grand Amphithéâtre, Prof William Wijns and Prof Jean Fajadet introduced the event at the opening ceremony, praising its incandescent programme and reiterating the event's goal of improving patients' lives. The ceremony also provided a wonderful platform to celebrate the prestigious Ethica Award, which was this year awarded to Dr François Bourlon and Dr Philip Urban for their work in establishing cathlabs in regions of great unmet need: Mauritania and Nepal, respectively. Philippe Urban concluded his acceptance speech with a poignant call to action, urging the interventional community to keep striving to expand the reach of their life-saving treatment.

With the event begun in earnest, delegates were treated to an extensive programme featuring a plethora of session formats, including live sessions, workshops, and plenary lectures. Navigation was facilitated by the EuroPCR app, which allowed visitors to keep abreast of the online schedule and all the latest news.

Among the highlights of the many scheduled events were the gripping live sessions on offer from all over the world, including Bahrain, China, France, Germany, and the UK. These sessions offered an amazing learning opportunity to attendees, who could ask questions directly to the operators via the EuroPCR app while the interventionalists dealt with the cases, complete with complications, in real-time. Technology is rapidly evolving in the

world of interventional cardiology, but these live sessions reminded viewers from around the world that at the heart of the discipline remains a singular, potent tool: clinical technique.

A great focus of this event was on the training and showcasing of young interventionalists. The European Association of Percutaneous Cardiovascular Interventions (EAPCI) Fellows Course allowed young interventionalists to interact with giants of the discipline in a welcoming and unique fashion, laying the groundwork for future collaboration between generations. In a competition dubbed 'PCR's Got Talent', young doctors had the chance to hone their presentation skills in front of their peers, sharing their research in rapid-fire 3-minute sessions. Winners from each session were selected, ultimately competing head-to-head to be crowned this year's champion.

"Torrential rain failed to put a dampener on the event, and the burgeoning storm outside was matched by the electric atmosphere crackling within the Palais des Congrès."

Presentation skills were not the only area in which attendees could improve themselves at this congress. A comprehensive training village gave attendees, young and old, the opportunity to take their skills to the next level. For the first time, simulation-based learning sessions for bail-out techniques were available, allowing doctors to practise the vital techniques with the help of cutting-edge technology. Another unique opportunity took the form of interactive picture sessions, entitled 'An Image is Worth 1,000 Words', in which cryptic pictures from interesting cases were presented, with the audience invited to diagnose them collectively.

Naturally, the congress was brimming with the latest research and there were plenty of late-breaking trials for delegates to sink their teeth into. The much-anticipated results of the SPYRAL HTN-ON MED trial were one such highlight, showing renal denervation to be an effective therapy for uncontrolled hypertension in patients with a background of commonly prescribed antihypertensive medication. In combination with the results from the SPYRAL HTN-OFF MED trial, these results indicate a promising future for renal denervation as a hypertensive therapy option and warrant larger clinical trials.

EMJ Interventional Cardiology 6.1 brings you all of EuroPCR's most vibrant highlights in the following section, and we hope that the content within satiates your appetite for striking research and provides a thorough overview of the event for those who could not attend this year. Paris remains the home of interventional cardiology for EuroPCR 2019, taking place on the 21st–24th of May, and the EMJ team looks forward to sharing that adventure with you next year.

Statement on Treatment of Chronic Coronary Syndromes

"UNTIL now, the prognostic role of percutaneous coronary intervention (PCI) in patients with chronic coronary syndromes is still unclear and [has] been questioned. Modern drug-eluting stent (DES) technology and better identification of ischaemia-driving lesions has helped to improve results. Important new data released during EuroPCR 2018 now strongly support the positive role of PCI in the treatment of chronic coronary syndromes." These were the words of Prof Michael Haude, President of the European Association of Percutaneous Cardiovascular Interventions (EAPCI), commenting on the PCR statement on chronic coronary syndromes, which was reported in a EuroPCR press release, dated 22nd May 2018.

"Important new data released during EuroPCR 2018 now strongly support the positive role of PCI in the treatment of chronic coronary syndromes."

Chronic coronary syndromes reduce physical endurance, can cause depression, and often require recurrent hospitalisation. Consequently, they have a significant impact on patients' quality of life. Recently, the results of new trials, many of which were presented at EuroPCR, have provided evidence supporting the use of PCI with the newest generation of DES for the treatment of chronic coronary syndromes. Previous trials that had shown limited evidence had not tested the latest generation of DES.

The PCR statement highlighted the results of several trials, including:

- ORBITA
- GZ-FFR
- FAME 2, DANAMI-3-PRIMULTI, and COMPARE-ACUTE
- Results from the Swedish Coronary Angiography and Angioplasty Registry (SCAAR)

The PCR statement highlighted several points of guidance for treating chronic coronary syndromes. Firstly, in comparison to medical treatment alone, the use of PCI as a treatment modality resulted in fewer spontaneous myocardial infarctions, fewer urgent revascularisations, fewer instances of angina, and an improved quality of life. The statement also explained that, in terms of mortality, stent thrombosis, and restenosis, fractional flow reserve/instantaneous wave-free ratio, physiology-guided PCI was superior to angio-guided PCI; this superiority remained for up to 10 years. It was noted that PCI demonstrated a greater benefit when there was a lengthier post-PCI observation period and also for coronary lesions with a greater degree of ischaemia. Indeed, the greater the degree of ischaemia noted for a coronary lesion, the greater the benefit of PCI. It is hoped that the release of this statement, in conjunction with the presentation of trial data, will provide valuable insight for medical professionals when they are considering the treatment of chronic coronary syndromes.

Pooled Data Show Stents Reduce Risk of Future Heart Attacks

FRACTIONAL flow reserve (FFR)-guided percutaneous coronary intervention (PCI) offers better hard outcomes than medical therapy for stable coronary lesions, according to a late-breaking trial, the results of which were revealed in a press release presented at EuroPCR 2018. These results from the first patient-level pooled analysis add to the ever-growing discussion regarding the role of PCI for improving patient outcomes for stable coronary lesions.

"Our results show for the first time that stents reduce the chances of having a future heart attack in clinically stable patients with such arteries."

The results from this first-of-its-kind pooled analysis of three Phase III trials showed a relative-risk reduction of ˜30.0% when using FFR-guided treatment compared with medical therapy for stable coronary lesions, including stable coronary artery disease and non-culprit lesions in haemodynamically stabilised acute coronary syndrome; this correlated to an estimated risk reduction of ˜4.5% at 5 years. The analysis of this pooled data, totalling 2,400 patients from the FAME 2, DANAMI-3-PRIMULTI, and COMPARE-ACUTE trials, showed, for the first time, that PCI, when coupled with FFR, reduces a patient's risk of hard endpoints, including cardiac death or myocardial infarction.

Each trial individually highlighted that FFR-guided PCI was favoured; however, none of the trials were powered for the endpoint of cardiac death or myocardial infarction. When pooled, this data was sufficiently powered to assess that FFR-guided PCI reduced the composite outcome of cardiac death or myocardial infarction when compared with medical therapy.

Dr Frederik Zimmermann, Catharina Hospital, Eindhoven, Netherlands, explained the pivotal impact these results will have on improving cardiac patient outcomes: "Medicine has two broad goals: making you feel better now and avoiding problems in the future. Widening narrowed heart arteries with stents has long been used to treat symptoms and stop ongoing heart attacks. However, whether stents can help avoid problems in the distant future has remained controversial. Pressure measurements inside the heart arteries can identify coronary arteries that should be widened. Our results show for the first time that stents reduce the chances of having a future heart attack in clinically stable patients with such arteries."

Analysis of the ORBITA Trial Results

OUTCOMES from a physiology-stratified analysis of the ORBITA trial were presented at this year's EuroPCR. These summarised the main clinical implications of percutaneous coronary intervention (PCI) in stable angina and single vessel coronary artery disease patients and the predictive value of fractional flow reserve (FFR) and instantaneous wave-free ratio (iFR). Reported in a EuroPCR press release dated 22nd May 2018, this stratification of ORBITA trial results provides the first placebo-controlled evidence of its kind.

During the analysis, invasive physiology data from 196 ORBITA trial participants were assessed to investigate the FFR and iFR predictors of the placebo-controlled efficacy of PCI. At pre-randomisation, 150 of 196 patients had Canadian Cardiovascular Society (CCS) Class II or Class III symptoms. Response variables,

treadmill exercise time, stress echocardiography score, symptom frequency, and angina severity were assessed at pre-randomisation and blinded on follow-up, and the effects were determined via analysis of covariance.

Stratification by invasive haemodynamic measures of stenosis and severity successfully demonstrated an association between FFR and iFR and the benefit of PCI. Looking at the results, the placebo-controlled effect of PCI was more clearly visible by stress echocardiography score and freedom from angina than change in treadmill exercise time. PCI improved stress echocardiography score more than placebo (1.07 segment units; 95% confidence interval: 0.70–1.44; p<0.00001), and this increase correlated with decreases in both FFR and iFR. Commenting on the significance of this result for physicians, Dr Rasha Al-Lamee, ORBITA principal investigator, Imperial College London NHS Healthcare Trust, London, UK, explained how it will now be possible to use iFR and FFR data to predict improvements in ischaemia as a result of stenting, even before the procedure.

In addition, more patients reported freedom from angina following PCI compared to placebo (49.5% versus 31.5%; odds ratio: 2.47; 95% confidence interval: 1.30–4.72; p=0.006); however, FFR and iFR did not modify this effect. The researchers noted that achievement of this secondary endpoint by patients increased by 20 absolute percentage points following angioplasty, meaning that one in five patients who are treated with angioplasty versus placebo will be more likely to be free from angina. "For patients, this is one of the most important things we can tell them, that they are more likely to become symptom-free," elucidated Dr Al-Lamee.

"For patients, this is one of the most important things we can tell them, that they are more likely to become symptom-free"

Overall, this analysis highlighted the predictive value of FFR and iFR in determining the placebo-controlled PCI effect on ischaemia. With this effect most clearly visible using stress echocardiography, the researchers noted that the next steps will investigate the extent to which this imaging technique itself predicts the impact of PCI. To apply these results to a wider patient base, preparations are now underway for a larger second ORBITA trial to include more patients with stable angina, with the hope of improving outcomes for many more PCI patients.

A Physician's Thought Process: Results from SYNTAX III

COULD non-invasive procedures replace cineangiography in heart team decision-making? The SYNTAX III trial aimed to develop a better understanding of the decision-making process of physicians, and its hotly anticipated results were unveiled in a EuroPCR press release dated 22nd May 2018.

"...the Cohen's kappa statistic was very high, 0.82, which can be called an almost perfect assessment/agreement"

Cardiac specialists from six international medical centres were enrolled in the SYNTAX III Revolution trial; the distinguishing feature of this trial was that the study co-ordinators randomised the physicians, not the patients, into two teams. The recruited surgeons, interventional cardiologists, and radiologists from each clinic were asked to diagnose and develop treatment plans for 233 clinical cases over an 18-month time period; each heart team saw the same cases. The heart teams had to consider several factors, including which vessels had to be revascularised, how many bypasses would be required, and how many stents should be used. The key area investigated was whether the teams chose to treat with surgery (coronary artery bypass graft) or percutaneous coronary intervention. The difference between the two teams was in the information available to them in determining their treatment approach: Team A could only use information available from non-invasive methods, such as multislice coronary computed tomography angiography and CT assessment (HeartFlow® Analysis, HeartFlow Inc., Redwood City, California, USA), whereas Team B used information from conventional cineangiography.

The decisions of the two heart teams were compared using Cohen's kappa statistical tests. Agreement between the two groups was very similar: "...the Cohen's kappa statistic was very high, 0.82, which can be called an almost perfect assessment/agreement," explained Prof Patrick W. Serruys, study Chairman, Imperial College London, London, UK. He added: "[Cohen's kappa statistic] showed good agreement as well in terms of the number of bypasses, how many stents should be used, and the location in the coronary circulation." Furthermore, the heart teams reported that the noninvasive diagnostic techniques provided a much clearer image of the patient's condition than the conventional techniques.

The main take away from the SYNTAX III Revolution trial is that noninvasive diagnostic techniques were found to be very useful. With the continued development of noninvasive diagnostic techniques, the future looks promising for these less invasive technologies; in fact, Prof Serruys predicted that within 5–10 years, noninvasive methodologies could have surpassed their conventional counterparts.

Presenting the EAPCI White Book

INTERVENTIONAL CARDIOLOGY practices from a range of countries have been documented in a first-of-its-kind survey and presented at EuroPCR 2018. According to a EuroPCR press release dated 22nd May 2018, the European Association of Percutaneous Cardiovascular Interventions (EAPCI) White Book describes the results from a 2016 survey that collected data on aspects such as treatment implementation and resource allocation. With the hope of delivering cutting-edge cardiovascular care for all patients, the data underlines major healthcare gaps and inequalities.

Data were collected on the practice of interventional cardiology by representatives of national cardiac societies and working groups under the leadership of Prof Michael Haude, EAPCI President, and in collaboration with the European Society of Cardiology (ESC) Atlas of Cardiology. The 16 countries involved were Belgium, Denmark, Egypt, France, Germany, Greece, Italy, the Netherlands, Poland, Romania, Slovenia, Spain, Sweden, Switzerland, Turkey, and the UK.

"The EAPCI White Book is an important companion to the ESC Atlas of Cardiology, providing more in-depth information on this rapidly growing domain in cardiology."

With regard to interventional procedures, the data highlighted that most countries surveyed were delivering ≥500 primary PCI procedures per million inhabitants, which was the target set by the EAPCI primary PCI implementation programme, 'Stent – Save a Life!' For example, PCI by insertion of a radial artery catheter and using drug-eluting stents where indicated was performed in >50% of PCI procedures in the majority of participating countries (>3,000 procedures per million people). However, some countries reported low numbers of patients treated with drug-eluting stents, suggesting there may be some implementation barriers to this method. The survey also showed that transcatheter aortic valve implantation and other similar structural treatment interventions are becoming more popular in the clinic, although discrepancies in reimbursement policies among the countries involved meant that the use of these therapies was not consistent.

Additionally, looking at resource allocation, the extensive survey results showed a vast variation among the included countries, suggesting focus is required on standardising resources among ESC member countries. For example, the number of hospitals with operating rooms for catheter-based procedures ranged from <2 to >5 per million people, and the number of interventional cardiologists per million people ranged from 10 to >25. By highlighting these differences, lead author Prof Emanuele Barbato, Cardiovascular Research Center Aalst, Aalst, Belgium, described how the EAPCI White Book will enable healthcare payers and regulatory bodies to re-evaluate interventional cardiology resource allocation across Europe, and allow industry bodies to invest in specific clinical needs.

"The EAPCI White Book is an important companion to the ESC Atlas of Cardiology, providing more in-depth information on this rapidly growing domain in cardiology," commented Prof Panos Vardas, senior author of the ESC Atlas of Cardiology and ESC Past President (2012–2016). The authors noted that future surveys will include more ESC member countries to provide a more comprehensive overview of interventional cardiology practice across the world. The EAPCI White Book was published online on 22nd May 2018 and can be accessed via an annual subscription.

Hypertension Management: New Evidence to Support Device-Based Therapy

MANAGEMENT of hypertension may soon become considerably easier, according to the results of two studies presented at EuroPCR in Paris, France, and revealed in a press release on the 23rd May 2018. The studies explored the potential of using device-based treatments to aid in therapy for hypertension.

The prevalence of hypertension is increasing dramatically, with >1 billion patients currently known to be affected around the world. Despite best efforts, and the availability of safe and reliable drugs to help manage the condition, patients become and remain nonadherent; for half of patients, this occurs within the first year of starting drug treatment, and around 20% of patients are nonadherent from the start. Previous clinical trials have highlighted these issues and also observed that the levels of adherence gradually worsen as patients are required to take more drugs to manage their condition.

The use of device-based treatments aims to improve this adherence and provide new treatment options, and, in this regard, there is a current focus on renal denervation (RDN). RDN has previously been shown to improve hypertension, even in those patients not taking any antihypertensive drugs. One particular advantage of device-based treatments and subsequent RDN, is that they are 'always on', even when the effects of antihypertension drugs begin to subside, for example, in the morning.

Two new clinical trials have provided further evidence that device-based therapy can help with controlling renal nerve activity and therefore lower blood pressure. The first, the SPYRAL HTN-ON MED study, used a radiofrequency device in combination with antihypertension drugs. The second, the RADIANCE-HTN SOLO study, used an ultrasound catheter to enforce RDN. These studies are vital for the advancement of hypertension treatment methods, particularly in providing beneficial evidence for the use of device-based therapy, and in determining which patients will respond favourably to each technique.

"These studies are vital for the advancement of hypertension treatment methods..."

Further studies will need to ascertain the parameters surrounding the procedure for successful RDN, as well as whether the lowered blood pressure achieved can be sustained. The information and evidence obtained from these future studies will improve the lifestyle of patients with hypertension, as well as reduce the risks to patients that are associated with hypertension.

Significant Outcomes of Renal Denervation

RENAL DENERVATION significantly reduces blood pressure in patients on antihypertensive medications, according to the international SPYRAL HTN-ON MED trial that was reported on at EuroPCR 2018. With many uncontrolled

hypertensive patients at an increased risk of cardiovascular events and stroke, this is an important finding for the one-third of adults with high blood pressure.

By targeting the sympathetic nervous system, renal denervation therapy provides an effective therapy for hypertension. Building on the results of the SPYRAL HTN-OFF MED trial, which provided a proof-of-principle for the efficacy of this therapy for patients not taking antihypertensive medications, the SPYRAL HTN-ON MED study aimed to investigate its effects in the presence of commonly prescribed hypertension medications. This randomised, sham-controlled trial involved 80 patients from 25 sites across the world who were assigned to two groups: sham control plus medication or renal denervation plus medication. Office blood pressure and 24-hour ambulatory monitoring at 6 months follow-up were used to measure changes in blood pressure following therapy.

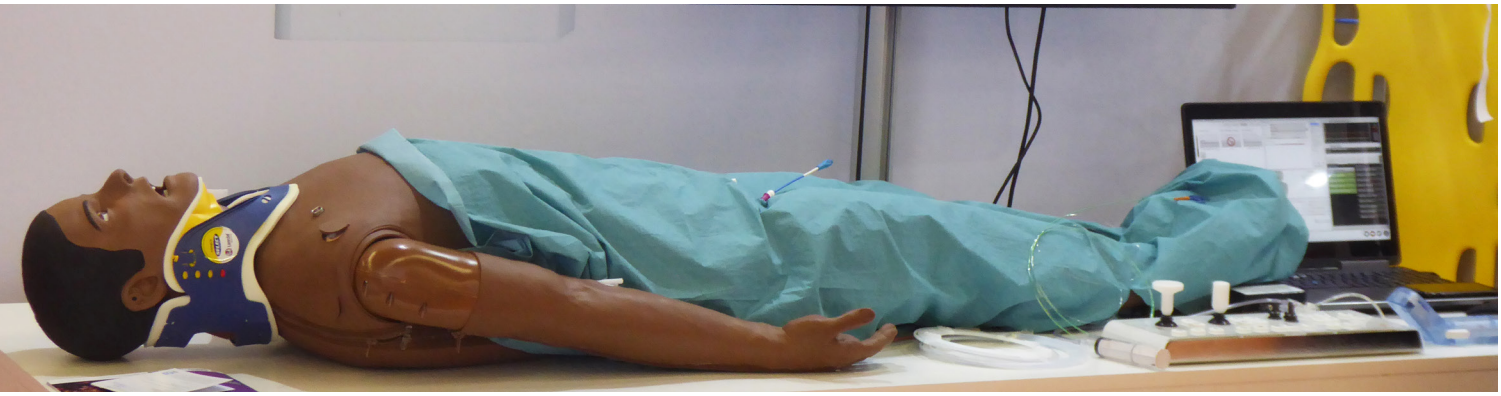
"This therapy proved to be safe, with no major safety events recorded despite the procedure extending into the renal artery branch vessels."

The study results demonstrated statistically significant and clinically meaningful reductions in both systolic and diastolic blood pressure with renal denervation; the 24-hour ambulatory monitoring results showed a -9.0 mmHg change in systolic pressure and a -6.0 mmHg change in diastolic pressure from baseline following renal denervation ($p<0.001$). This trend was reflected in the results of the office blood pressure measurements, for which decreases from baseline following renal denervation were recorded at -9.4 mmHg and -5.2 mmHg for systolic and diastolic pressure, respectively. The authors observed a further decline in blood pressure between 3 and 6 months follow-up after renal denervation therapy, and reductions in blood pressure were recorded throughout the day and night, lasting over 24 hours.

This therapy proved to be safe, with no major safety events recorded despite the procedure extending into the renal artery branch vessels. The study authors expressed hope that the results of this trial will enhance the ongoing global SPYRAL HTN-OFF MED trial and motivate the conduction of larger studies of patients with uncontrolled hypertension on antihypertensive therapy.

Call to Expand Treatment for Acute Ischaemic Stroke

IN SOME European countries, <1% of acute ischaemic stroke patients can be treated with mechanical thrombectomy. Even the countries with the highest number of mechanical thrombectomy specialists, such as the Netherlands, Germany, and the Czech Republic, only have the capacity to treat about 33% of patients. Due to the paucity of other efficacious treatment modalities, this gap in treatment availability represents a significant issue. However, as reported in a EuroPCR press release dated 25th May, the European Society of Cardiology (ESC) Council on Stroke and the European Association of Percutaneous Cardiovascular Interventions (EAPCI) have volunteered a solution. The details of this proposal were shared at EuroPCR 2018.



Currently, mechanical thrombectomy represents a significantly more effective treatment option for patients presenting with acute ischaemic stroke. Around half of all patients treated with mechanical thrombectomy will survive and function with normal neurological capabilities thereafter, with this figure rising to >70% if the procedure is carried out within 2–3 hours of symptoms presenting. In contrast, 75% of patients treated with clot-busting drugs either die or are severely disabled. Therefore, enabling 100% of patients to be treated with mechanical thrombectomy would greatly improve outcomes. The main barrier preventing this from becoming reality is the lack of know-how rather than a lack of infrastructure. As Prof Petr Widimsky, Chair of the ESC Council on Stroke, acknowledged: "There are interventional cardiology units in all countries in Europe and the Americas, and in most other continents. The equipment for mechanical thrombectomy is available; it is the trained specialists to perform the procedure that are lacking."

"This situation could be solved by training cardiologists to perform mechanical thrombectomy."

The training required to perform mechanical thrombectomy, which is currently provided by interventional neuroradiologists, is typically around 2 years. This also represents a barrier towards achieving the capacity to treat 100% of patients. However, the ESC Council on Stroke and EAPCI have put forward a solution that could overcome both the lack of specialists and the time taken to conduct training. Prof Widimsky explained: "This situation could be solved by training cardiologists to perform mechanical thrombectomy." Prof Widimsky went on to note that the proposal recommended that interventional cardiologists undergo 3 months of training on mechanical thrombectomy, stating that: "Many interventional cardiologists routinely perform stenting of the carotid arteries, so 3 months of training is sufficient to learn intracranial mechanical thrombectomy." With this proposal having been put forward, time will tell if health authorities in each country accept it.

PCR Innovators Day 2018

REVOLUTIONARY transformations in healthcare, particularly cardiology, were the focus of this year's PCR Innovators Day, which took place at EuroPCR. Clinicians, industry experts, entrepreneurs, and investors were brought together to gain insights into the bright future of interventional cardiology, one in which innovative advances, such as big data and artificial intelligence (AI), will play vital roles in clinical decision-making.

Described as being 'on the cusp of a revolution', cardiology will soon be transformed by the introduction of AI techniques to augment, rather than replace, clinicians, and this theme was clear throughout the PCR Innovators Day. Industry representatives described how a blend of computer and human aspects will optimise patient care; for example, AI platforms have now been created that can process ultrasound and X-ray data to diagnose aortic stenosis more effectively and consistently. In addition, a big data approach using panomics measurements has allowed the identification of a new pathogenic pathway and single enzyme involved in cardiovascular disease, creating a complete paradigm shift in coronary disease therapies.

Attendees also had the opportunity to learn about other futuristic applications, including 3D printing of patient-specific replicas of the heart

and blood vessels for pre-surgery assessments, and the use of computer models to evaluate the performance of new devices preoperatively. These novel innovations may mean that cardiologists could plan and practise procedures before operating, particularly for high-risk patients, enhancing patient care and potentially improving the recovery process. Furthermore, microvascular occlusion following a serious myocardial infarction was also considered, with a new procedure described that involves the insertion of a balloon to occlude the blood flow and measurement of downstream pressure and microcirculation resistance.

"I think the striking thing for me is the breadth of innovation that's going on across the spectrum of cardiovascular medicine."

With these technologies fast-approaching, and many more on the horizon, attendees were shown how we will soon be part of an era in which individual patients will be at the very heart of clinical decision-making, and the use of imaging in making diagnoses, creating training models, and virtually treating patients will be of utmost importance. "I think the striking thing for me is the breadth of innovation that's going on across the spectrum of cardiovascular medicine," commented Dr Bernard Prendergast, Guy's and St Thomas' NHS Trust, London, UK. He added: "The application of imaging science and the use of big data in the field of AI is something we need to embrace as clinicians."

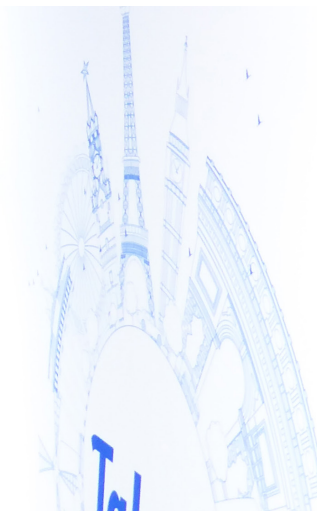
The Future of TAVI

Late-breaking trial data presented at EuroPCR 2018 showcased promising results for transcatheter aortic valve implantation (TAVI) for aortic stenosis. Sustained safety and efficacy results were achieved at 1 year in the CENTERA-EU trial, and mortality at 1 year was not associated with the prosthesis or pacemaker in TAVI patients in the REBOOT study. Furthermore, real-world outcomes of TAVI using a balloon-expandable valve showed no differences in all-cause mortality, strokes, and pacemaker rates. New emerging devices with lower complication rates mean the future is bright for TAVI.

"New emerging devices with lower complication rates mean the future is bright for TAVI."

The Stent – Save a Life! Forum

Founded on a European-wide basis in 2009, the 'Stent – Save a Life!' Initiative is a network of professionals interested in ST-segmental elevation myocardial infarction (STEMI) care, and this year's forum at EuroPCR 2018 provided a vital opportunity to exchange views and learn from others from across the globe. The various challenges experienced were discussed, including those from Myanmar and Hong Kong, and new German and Argentinian data were revealed. Modern technologies were also presented, including a management app from Mexico, a Dutch travel app for cardiac care, a 'heartbreak jacket' from Taiwan, and a tablet developed by the STEMI Indian project to record ECG results, blood pressure, and treatment.



The forum drew to a close with an update on STEMI care in daily practice, touching on the role of pharmacoinvasive approaches in countries where primary PCI is not possible.

The Launch of Euro$_4$C

Open to all European interventional cardiologists, this year's EuroPCR saw the launch of the new Euro$_4$C Project, which aims to improve the clinical outcome of complex cardiology patients who are often denied percutaneous treatment due to their high clinical risks. The project is committed to sharing clinical and technical expertise to enhance the cardiac care of these patients through continuous education, practical training, technological developments, and implementation of clinical studies. With today's ageing population, providing cardiac care for complex patients is vital, and the timely launch of Euro$_4$C will allow dedicated experts to extend best medical practice to all.

"The project is committed to sharing clinical and technical expertise to enhance the cardiac care of these patients..."

Positive News on Drug-Eluting Stents

Compared to bare-metal stents, drug-eluting stents were shown to perform much better in complex lesions and in patients with short dual antiplatelet therapy, revealed in a late-breaking trial session at EuroPCR 2018. Results from the LEADERS FREE study and BIO-RESORT study highlighted the benefits of these devices for the treatment of complex percutaneous coronary intervention patients, while the MASTER study found drug-eluting stents to be safe and efficacious. Session co-chair, Ron Waksman, MedStar Heart and Vascular Institute, Washington DC, USA, concluded that there is now no role for bare-metal stents in the interventionalist's repertoire.

Heart Valve Voice Arrives in Paris

For the second year running, members of the UK charity Heart Valve Voice once again arrived in Paris to raise awareness of heart valve disease. After a 2-day cycle from London, patients, physicians, and volunteers arrived at EuroPCR, and their successful trip was celebrated by all attendees. This positive initiative also highlighted the first ever European Heart Valve Disease Awareness Day, due to take place on 8th September 2018, which will bring together European countries to disseminate crucial information on the effects of valve disease.

Out-Of-The-Box Thinking

As part of the 'Out-of-the-box technologies' session at this year's EuroPCR, novel strategies were discussed for heart failure and myocardial infarction. These included a subcutaneous pump attached to a catheter to achieve removal of excess fluid in heart failure patients without the need for peritoneal dialysis, hence reducing hospital admissions. Further showcases involved the presentation of an adsorber device to selectively remove C-reactive protein from the blood of myocardial infarction patients, reducing the trigger of complement and phagocytosis, and a carbon fibre drape to cover patients and limit X-ray scatter radiation to the cathlab.

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Interviews

Presenting a collection of interviews from our esteemed *EMJ Interventional Cardiology* Editorial Board members

Featuring: Sundeep Mishra, Pablo Sepúlveda Varela, and Hosam Hasan

Dr Sundeep Mishra @Facebook

All India Institute of Medical Sciences (AIIMS), India

You have led a very successful career in cardiology to date, receiving many awards recognising your numerous contributions to the field. What is it that keeps you motivated and excited to pursue further research?

My motivation has been my ability to make material contributions to the field, to help individuals by relieving symptoms and increasing lifespan but, most importantly, to change the world for the better.

You were the first person in India to carry out experimental angiogenic gene therapy. Briefly, what does this procedure entail and how is it changing cardiological therapy?

Angiogenic gene therapy is a line of hope for patients with end-stage heart disease; it offers the potential to rebuild the cardiac and peripheral vasculature and ameliorates severe symptoms, possibly prolonging life.

You have extensively researched bioresorbable stents (BRS), including their purpose, limitations, and new designs that have improved their use in the clinical setting. Can you briefly describe the main outcomes of your research and how important you feel these stents are for future scaffolding in coronary arteries?

The creation of BRS is the most recent advancement in the field of stent technology. Conceptually, while treating an obstruction in an artery, a scaffold or support is required for a short duration of time, maybe 3–6 months, but current metallic (stainless steel or cobalt-chromium) stents remain for life once implanted, with consequent long-term issues. BRS, on the other hand, do what they are intended to do (short-term scaffolds for the diseased and intervened artery) and then dissolve (they are absorbed), leaving behind no trace of the original stent. They are certainly the future of

stent technology but have not yet been perfected, and therefore their performance does not currently match the drug-eluting stents (DES) available. At the moment, it seems an unequal comparison between the first generation of BRS with the fourth generation of DES.

Do you think BRS can be adapted even further and, if so, how would you like to see them develop in the near future?

The major lacunae in the technology of BRS is the logarithmically inferior mechanical properties of the materials that BRS are made from (polymer or magnesium) compared to DES (made of cobalt-chromium or stainless steel), in terms of radial strength, tensile strength, possibility of fracture, and lower radio-opacity. Minor alterations that improve material strength or innovations in design may be unable to overcome the vast differences in mechanical attributes alone. Radical innovations in polymer or material technology will be required, wherein new bioresorbable material can replace the currently available material.

You have also engaged in a lot of research into chronic total occlusion (CTO) interventions. What is the most innovative advancement you have seen in this area of research during your career?

New hardware, including guidewires, microcatheters, and balloon catheters, have been developed with special characteristics to overcome a specific problem in CTO interventions, so much so that a whole new language of CTO interventions has been developed. Retrograde CTO intervention via a donor artery using collaterals is another remarkable advancement.

You have been involved in the regulatory affairs of various medical decisions. How do you think medical regulations need to change over the next 5 years?

Regulatory affairs are a very important aspect in device development and can help guide the field to develop in the right direction. They operate on a very thin line; on one hand, they should allow newer innovations to reach medical practice, but on the other, they also need to make sure that the innovation is safe, is correctly applied, and at the same time not wasteful.

You have published extensive guides on catheterisation procedures. How important is it that information like this is shared with the wider community and how can it be better disseminated?

In the contemporary scientific world, it is of utmost importance to share ideas and the outcomes of ideas with one another. Not only do shared outcomes serve as a nidus for new ideas, but they also guide the field in the right direction and avoid wasteful reinvention (the wheel need not be invented again and again). No progress can be made *de novo*; it comes as an advancement of existing knowledge only. In any innovation, one must "stand on the shoulders of giants". Modern technology can be utilised to the hilt to disseminate new ideas, this can include not only online open access journals and blogs but also Facebook, Twitter, and other mass media, and even YouTube and webcasts.

Are there any particular complications that can arise in catheterisation laboratories that you feel should be highlighted, and how do you go about resolving them?

The field of interventional cardiology is like that of fighter pilots: once on the job, some complications are inevitable. Anticipate, avoid, and ameliorate are the three 'As' in this area. Most complications are related to improper selection of case, hardware, collection of preinterventional information, technique, and follow-up.

In the field of aviation, good manuals are available describing what to do and when; however, in contrast, in the field of interventional cardiology, procedural knowledge has not been systematically verbalised and has remained so despite >30 years of clinical percutaneous coronary intervention (PCI) practice (perhaps because of the rapid changes in PCI technology). Thus, there is a need to build the collective memory of cases and develop cognitive teaching programmes based on the retrieval of expert knowledge, rather than a mere mentor-guided empirical approach, to try and begin to close the gap between the training modus in aviation and PCI.

What research are you currently working on, and what aspects of it do you find most exciting?

Currently, my research is focussed on BRS, CTO interventions, dedicated bifurcation stents, and primary PCI. I am also initiating projects in three-dimensional (3D) printing and nanomedicine. I find working in these areas, which can be termed 'final frontiers' in interventional cardiology, most exciting.

Where would you like to see interventional cardiology research directed in the next 10 years? Are there any ongoing projects that you are particularly eager to discover the outcomes of?

The application of 3D printing and nanorobotics should be the future of interventional cardiology. It may be possible to design custom-made materials for devices such as stents and valves for interventional use in the near future. Nanorobotics is another area that should be operational soon. A nanorobotic device could be introduced into the human body percutaneously and act as a homing device, searching for pathology, diagnosing it, and even curing it by nanomanipulation, all the while co-ordinated by an onboard computer, maintaining contact with the supervising interventionist via coded ultrasound signals. The femtosecond laser, a nanorobot, can act like a pair of nanoscissors and vaporise diseased tissue locally while leaving adjacent tissue unharmed; this procedure has already been performed on individual chromosomes. Another exciting area that could be used is the creation of a new class of self-powered implantable medical devices, sensors, and portable electronics, which work by converting mechanical energy from body movement, muscle stretching, or water flow into electricity, while our bodies are already converting chemical energy from glucose to mechanical energy for movement. This novel technology could convert mechanical energy generated by movement within the body into electrical energy to run pacemakers or implantable cardioverter defibrillators, obviating the need for external batteries and thus leading to permanent self-powered medical devices.

Finally, humankind is engaged in an ongoing quest to make therapy less invasive and more convenient, of course without losing any of its efficacy. Thus, there is a constant shift towards a simpler form of treatment, from surgical to interventional. Over the course of time I would like to see interventional cardiology become the alternative to surgery in all areas. Percutaneous valve replacements and leadless pacemakers have already been created and are likely to be refined even more; ultimately, these techniques will be developed for paediatric cardiology and even percutaneous transplantation.

"The application of 3D printing and nanorobotics should be the future of interventional cardiology."

Dr Pablo Sepúlveda Varela

Hospital San Juan de Dios, Chile

What led you to pursue a career in cardiology and subsequently specialise in and practice interventional cardiology?

It was early during my years at medical school that I decided to pursue a career in cardiology due to the burden that cardiovascular disease imposes on society on a global scale. It also attracted me due to the possibility of tackling the leading cause of death in my country. I was lucky enough to have tutors and mentors throughout my training who were leaders in cardiovascular research and intervention in Chile. Helping them in their clinical research and witnessing their progression in the cathlab on a daily basis also stimulated me to pursue

a career in interventional cardiology. I was not only engaged by their knowledge but also by their leadership ability. Finally, the blending of clinical and interventional skills needed to get into the field was (and still is) a challenge to any physician. I have always loved challenges!

Could you give us a summary of your role and responsibilities at Hospital San Juan de Dios and describe a typical working day in a busy hospital environment?

In my centre, I have many responsibilities. First and foremost, I spend roughly 60% of my time in the cathlab. There, I carry out the regular work that is done in any cathlab around the world: elective cases, acute coronary syndromes, structural cases, etc. I am on call every Monday night and once a month for the full weekend, for primary percutaneous coronary intervention. Of utmost importance is the work I have been performing during the last few years in right heart catheterisation, pulmonary angiography, and balloon pulmonary angioplasty (BPA). A typical day involves an early start of 7am, where I review the cases scheduled for that day, and then I go on to assist the fellows-in-training with their own cases, complete ward rounds, etc. As head of the outpatient pulmonary arterial hypertension (PAH) clinic, I have to evaluate patients and control their condition once a week. I am also in charge of ongoing clinical research in our department. As such, I have to fulfil my duties as principal investigator for our ongoing studies, most of them on pulmonary hypertension and coronary heart disease.

Your medical group was the first in Chile to adopt the procedure of BPA in the treatment of chronic thromboembolic pulmonary hypertension (CTEPH). What led you to use and develop this pioneering procedure?

This came about as an unmet need in the treatment of CTEPH patients. In our country, access to targeted therapies for PAH is limited, as is the availability of pulmonary endarterectomy (PEA), the treatment of choice for CTEPH. PEA is performed in very few centres in Chile; the cases are anecdotal, the experience limited, the results unknown, and the procedure is highly dependent on the surgical expertise. In my hospital, because it is a referral centre, we can offer specific therapies for PAH, but this solves only part of the problem. CTEPH is the only curable form of PAH, so if surgery was not available, or patients were excluded for whatever reason from PEA, we felt we needed to offer them an alternative. That is where we decided to get involved in BPA. I was privileged to have the opportunity to visit Dr Takeshi Ogo in Osaka. Dr Ogo is a world-renowned expert in BPA. His group, with others from Japan, have pioneered and led the field of BPA in recent years. Witnessing how they selected the patients, how they organised their work and review their cases, and, of course, learning the 'tips and tricks' of this technique, was key for me in starting the BPA programme in my institution. I am very grateful, and I feel honoured by the help received from Dr Ogo's group.

The application of BPA does not come without risk. How do you decide which patients should receive BPA? Additionally, you are actively involved in training your fellow physicians in BPA; what methods and techniques do you teach and emphasise in training to minimise the risk of procedural error?

The risk can be minimised by carefully selecting the candidates for BPA. To do so, we rely on a multidisciplinary team that first determines the operability. If the patient is excluded from surgery, then we, the interventionalists, decide which patients could benefit the most from BPA. Our group is still on a learning curve for the procedure, so once we have angiographically identified the target lesions, we perform intravascular images with optical coherence tomography. By using optical coherence tomography and targeting those specific lesions more suitable for BPA (e.g., web and slit type lesions), we can optimise the results of this technique. The most important thing to teach and emphasise is to not think of BPA in terms of a classical angioplasty, and certainly not in terms of coronary angioplasty. With BPA we are not aiming for angiographically perfect results and we are not even looking for a 1:1 relation between balloons and arteries. In BPA the objectives

are different: ameliorating flow, segment by segment, session after session, and carefully applying balloons at different levels, regardless of the angiographical result. This is the most difficult aspect to learn. Patience is key. The interventionist and the patients must understand that, to achieve optimal results, many sessions of BPA are needed.

Some studies suggest that BPA improves haemodynamics and functional capacity, including certain studies from Japan. How do the patient outcome results from your studies compare?

In fact, the Chilean population is very similar to the Japanese population. Of our patients, 38% have a history of deep vein thrombosis, and 75% have a history of acute pulmonary embolism, 85% of them being women. We have observed the same results in the short term as the initial studies in Japan and in other countries: 25% decline in mean pulmonary artery pressure, 40% decline in pulmonary vascular resistance, 14% increase in cardiac index, 26% increase in walking distance, 24% increase in functional class, and 50% decrease in NT-pro BNP. There were <2% vascular complications and only 6% reperfusion injuries.

As a fairly new technique, the knowledge of the long-term effects of BPA is limited. What steps do you take to ensure your patients avoid postoperative complications and remain in good health when recovering?

Our patients remain in contact with the PAH outpatient clinic where we perform regular controls of their condition and schedule visits: every month for the first 3 months and every 3 months thereafter. The aim is to evaluate right ventricular function and check the functional status after the procedure. This is done clinically and with non-invasive and specific laboratory tests.

"Interventional cardiology has evolved faster than any other type of treatment in the field of cardiovascular diseases."

What steps do you believe the medical community should take to increase the use and improve the process of BPA to avoid the need for pulmonary endarterectomy, a much more invasive procedure?

I cannot stress this more: PEA cannot be avoided. It is the treatment of choice, the first alternative; this is, of course, if you are lucky enough to work in, or have access to, a centre where the expertise and results are optimal, like in some centres in the USA, Germany, or Japan. If this is not the case, then the physicians involved in PAH care should be actively screening for CTEPH patient candidates for BPA. As I said before, it is the only PAH that is curable. My group and others around the world are beginning to show that BPA can be reproduced and implemented relatively easily and safely. It is far less expensive and technically less demanding than PEA, and can achieve excellent haemodynamical and clinical results in the short term, improving quality of life.

With an ever-growing number of patients suffering from cardiac disease and associated complications, what do you believe the primary focus of interventional cardiology should be over the coming years?

Interventional cardiology has evolved faster than any other type of treatment in the field of cardiovascular diseases. At this moment in time, coronary interventions have advanced enough to be able to offer an ample range of possibilities: multivessel revascularisation, coronary chronic total occlusion interventions, left main, bifurcations, etc. Every day we see advances in structural interventions as well. The main focus of interventional cardiology for the following years, in my opinion, is to try to better identify and characterise the vulnerable plaque, so it can become possible to prevent myocardial infarction. It is also to expand the possibilities of endovascular therapies to heal damaged myocardium, and finally deliver all these in a personalised and cost-effective way to tailor the best treatment option.

Implementing a pioneering new treatment option is an incredible achievement; what do you consider your single biggest success to be?

My biggest accomplishment so far is to have been able to organise a group to offer quality care for PAH patients in an environment where resources were not abundant, by granting access to new treatments through clinical trials and innovative interventions. BPA is only part of what we do. It is interesting, novel, and challenging, but it is just part of a comprehensive care that is offered at our PAH clinic, a model in the country.

Finally, with young interventional cardiologists in mind, if you could give your younger self one piece of advice for the future, what would it be?

Lead by example and do the best you can every day, find the best mentor possible, and always, always, follow your heart!

"It was early during my years at medical school that I decided to pursue a career in cardiology, due to the burden that cardiovascular disease imposes on society on a global scale."

Prof Hosam Hasan @hosam_hasan70

Assiut University Heart Hospital, Egypt

What first attracted you to the field of cardiology and, in particular, interventional cardiology?

We all know that the feeling of helping to cure patients is great, but the feeling of saving someone's life is even greater. This is the difference, I think, between cardiology and other branches of medicine. In addition, during my medical study I found that cardiology is the most rapidly developing field in medicine, with lots of undiscovered potentials. By specialising in interventional cardiology, it enables you to practice medicine with the self-satisfaction and interventional capabilities of surgeons.

You have expressed interest in the optimum duration of dual antiplatelet therapy to protect patients from stent thrombosis and major adverse cardiovascular and cerebrovascular events; what do you find most fascinating about this topic? Do you think individualised medicine is important for the future direction of interventional cardiology?

I think that we are entering an era of shorter durations of dual antiplatelet therapy. Of course, individualisation is very important in this issue because each patient has a completely different story with a different scenario.

You are the treasurer of the Egyptian Society of Cardiology (EgSC); what duties do you undertake in this role, and what would you say are your key responsibilities?

The duties and key responsibilities of the treasurer are mainly fundraising for the different activities of the society, setting priorities, and, of course, reviewing the financial aspects of the different projects.

What challenges, in terms of research, does the field of interventional cardiology currently face and how do you believe these should be approached?

One of the challenges is the high cost of the new devices, and this is one that can be solved by increasing the number of devices used,

which can have a positive impact on reducing the cost. The second challenge is the problem of obtaining patients' consent to invasive follow-up protocols. Fewer numbers of patients now accept invasive follow-up protocols and this is the most difficult challenge to deal with, especially with the cultural differences in patients' responses to the procedures.

You have authored publications on the endovascular treatment of coronary steal using Histoacryl® and reported N-butyl cyanoacrylate to be a useful interventional embolic agent. What further steps need to be taken now to implement its use into clinical practice?

This material, despite being much cheaper than coiling, is not used in coronary artery surgery because it requires surgeons with a lot of experience in its use to avoid back-spilling in the coronary arteries, as well as a long safety margin in the collateral vessel. Therefore, application of Histoacryl needs both an experienced operator in the use of the material in extracardiac indications and a proper patient selection.

What advice would you give to someone who is keen to start a career in the field of interventional cardiology?

The most important advice is to be patient, meticulous, and detail-orientated, and start by learning what the nurses and technicians do in the catheterisation laboratory and follow the protocol. I also advise someone to pay attention to the tips and tricks of the experts.

The field of interventional cardiology is projected to expand rapidly over the next 5 years. What do you believe are the major drivers for the cardiology and peripheral vascular devices market?

I think the major drivers will be rapidly advancing technology and the implementation of structural heart disease interventions, especially valvular interventions. This will be made possible by rapidly evolving multimodality cardiovascular imaging and advanced computational models.

Do you see any opportunities for the use of wireless technologies and biosensors? Are there any innovative technologies expected to be released in the near future that particularly interest you?

Indeed, I believe the future will carry a lot of innovations in the application of wireless technologies in the field of cardiology. Although this seems more promising and intriguing in the field of arrhythmology and related devices, I believe that it might also be applicable in terms of interventional device navigation and targeted drug delivery.

Can you explain the biggest challenges you have faced in achieving successful interventions for congenital heart defects?

As a matter of fact, congenital heart defect intervention is a multidisciplinary task that requires collaborative efforts of interventionalists, surgeons, and cardiac imagers. A fault in one part of this team would endanger the whole mechanism; therefore, the highest success rates are achieved when the whole team is well trained and supportive of each other.

Finally, out of your accomplishments in your career thus far, what would you say is your proudest achievement?

When it comes to achievements, the thing that makes me most proud is teaching younger generations not only technical skills and collaborative research work, but also discipline and the spirit of team work. Education and training remain my biggest passion and challenge.

"...be patient, meticulous, and detail-orientated, and start by learning what the nurses and technicians do in the catheterisation laboratory and follow the protocol."

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Dual Antiplatelet Therapy Challenges in Complex Clinical Scenarios

This satellite symposium took place on Wednesday 23rd May 2018, in Paris, France, as part of EuroPCR 2018, the annual meeting of the European Association of Percutaneous Cardiovascular Interventions (EAPCI)

Chair People: Pieter Smits,[1] Marco Valgimigli[2]

Speakers: Bernard Chevalier,[3] Pascal Vranckx,[4] Thomas Cuisset,[5] Antonio Colombo[6]

1. Maasstad Hospital, Rotterdam, Netherlands
2. Inselspital, Universitätsspital Bern, Bern, Switzerland
3. Institut Cardiovasculaire Paris Sud, Paris, France
4. Hartcentrum Hasselt, Hasselt, Belgium
5. Centre Hospitalier Universitaire (CHU) de la Timone, Marseille, France
6. Centro Cuore Columbus and San Raffaele Scientific Institute, Milan, Italy

Disclosure: Dr Smits has received speaker fees from Abbott and Terumo and grants from Abbott. Prof Valgimigli has received consultancy fees from Abbott, Daiichi Sankyo, Terumo, and Cardinal Health Switzerland; has received honoraria speaking fees from CID/Alvamediva and AstraZeneca; has received research grants from the Swiss National Foundation (SNF), Terumo, Medicure, Abbott, and AstraZeneca; and has served on the advisory board for Bayer, Chiesi, and Amgen. Dr Chevalier has received honoraria or consultation fees from Biotronik, Cordis, Cardinal Health Company, Medtronic, and Terumo. Dr Vranckx has been a speaker or participant in accredited Continuing Medical Education and Continuing Professional Development events for AstraZeneca, Bayer Health Care, Biosensors, and Daiichi Sankyo; and has been a consultant or strategic advisor for Bayer Health Care and Daiichi Sankyo. Dr Cuisset received lecture fees from Abbott, Vascular, Astra Zeneca, Boston Scientific, Daichi Sankyo, Edwards, Eli Lilly, Hexacath, Medtronic, and Terumo; and has consulted for AstraZeneca, Daichi Sankyo, and Eli Lilly. Dr Colombo has declared no conflicts of interest.

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Meeting Summary

The symposium was a practical, case-based discussion in which four panellists each presented a real and challenging case regarding dual antiplatelet therapy (DAPT) strategy. The audience and other panel members were invited to give their thoughts on the difficult decisions that arose during treatment.

Case 1, presented by Dr Chevalier, was a man with multivessel disease, enrolled in the Discovery 1TO3 trial.[1] He received staged treatment with three stents; strut coverage was evaluated with optical frequency domain imaging (OFDI). Four days after the staged percutaneous coronary

intervention (PCI), the patient suffered a Bleeding Academic Research Consortium (BARC) Type 3a gastric bleeding event and the gastroenterologist requested that the DAPT be stopped.

Dr Vranckx presented Case 2, in which a man, aged 84 years, presented 5 hours after myocardial infarction. He had a bifurcation lesion and was treated with a two-stent technique. Bleeding and ischaemic risk scores varied according to the risk scoring system used, but overall this patient had a high bleeding risk (HBR) and reasonable ischaemic risk. Treatment had to balance the two risks.

Case 3, presented by Dr Cuisset, was a 62-year-old male with chronic coronary artery disease (CAD), alcohol abuse, and Type 2 diabetes mellitus with poor adherence to metformin. The patient had good haemoglobin levels and renal function, and moderate liver abnormalities. He had thrombocytopenia and stable angina with prior documentation of ischaemia under stress. There was no significant lesion on the left anterior descending artery (LAD) or left coronary artery, but a 60–70% stenosis of the mid-right coronary artery (RCA). He was likely to be nonadherent to antiplatelet therapy.

Dr Colombo presented the fourth case, in which a 73-year-old male had a large thoracoabdominal aortic aneurysm and had been referred from vascular surgeons. He had standard risk factors for CAD, reasonable ejection fraction (EF), and no significant valvular disease. Preoperative coronary angiography showed a noncritical stenotic lesion on RCA, a 90% stenotic lesion mid-left circumflex artery (LCX), and total occlusion of LAD. PCI ahead of vascular surgery could involve one, two, or three vessels.

Case 1: Many Stents, An Emergency, and Now What?

Doctor Bernard Chevalier

Case Description

Case 1 was a male with risk factors for dyslipidaemia and hypertension for which he was taking fluvastatin and ramipril, respectively. He had no significant comorbidity. His angina was symptomatic and was Canadian Cardiovascular Society (CCS) Grade III but had been stable for 3 months. Thallium scintigraphy had shown anterior and septal ischaemia and an EF of 58% at rest that reduced to 50% at stress. Diagnostic angiography showed intermediate lesions on the distal left main, proximal, and very distal lesions but nothing notable on the LCX. Of the two regions on the right, one was mid segment and one just before the crux. Fractional flow reserve (FFR) from left main to LCX was 0.85 and it was therefore unnecessary to consider the left main for revascularisation. The SYNTAX score without taking account of the left main lesion was 15. SYNTAX II scores were 29 for PCI and 30.5 for coronary artery bypass graft.

The patient was enrolled in the DISCOVERY 1TO3 trial[1] of PCI and received a loading dose of clopidogrel or aspirin. The post-PCI regimen included clopidogrel for 6 months, aspirin, ramipril, and rosuvastatin. DISCOVERY 1TO3 included 60 patients with multivessel disease. They received staged treatment with the Ultimaster® drug-eluting stent (DES) (Terumo Corporation, Tokyo, Japan). Strut coverage was evaluated with OFDI at baseline when the first stent was implanted, at 1 month at staged stenting, and at 3 months. This gave 1 and 3-month data on the first stent and 2-month data on the staged stent.[1]

The patient in this case had PCI of the LAD at baseline with Ultimaster 3.0x24 mm with high pressure post dilatation because of calcification. A month later the two lesions on the right were addressed with Ultimaster® 3.0x18 mm and 3.5x15 mm, both pre and post-dilatation. Four days after the staged PCI, 36 days after the LAD PCI, the patient had significant haematemesis with a 4.5 g/dL drop in haemoglobin, defined as a BARC 3a bleeding event. He was haemodynamically stable, transfused with two packs of blood, and received intravenous proton pump inhibitor (PPI). Emergent gastroscopy revealed a gastric ulcer with arterial bleeding, which was treated with electrocoagulation. Two days later, a control gastroscopy showed persistent mild bleeding and the gastroenterologist requested DAPT cessation.

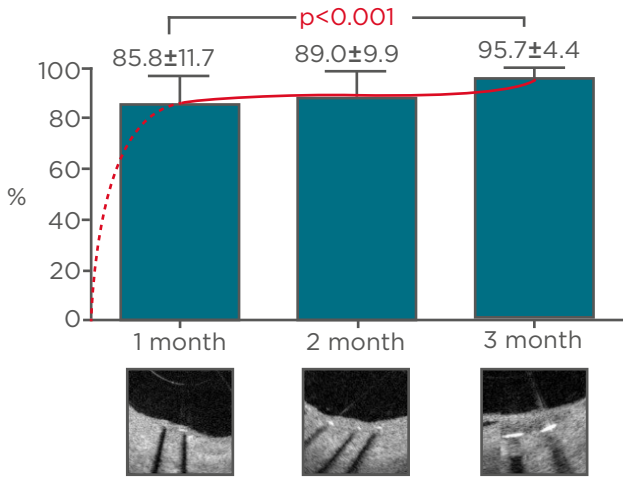

Figure 1: Optical frequency domain imaging was used to assess the percentage of covered struts 1, 2, and 3 months after implantation.

Adapted from Chevalier et al.[1]

Discussion Point 1: Dual Antiplatelet Therapy Strategy Following a Gastrointestinal Bleed

The team's options were to stop one antiplatelet agent, either aspirin or clopidogrel, or both; the decision could be based on platelet testing or the OFDI. Alternatively, the gastroenterologist's request could be refused and DAPT continued.

The question was posed to the audience, and just under half said they would stop aspirin. Nobody would stop clopidogrel or both drugs. On the panel, Dr Cuisset said he would stop aspirin, noting that the gastric ulcer had been treated and the bleeding was mild and did not justify stopping DAPT altogether 4 days after PCI. Dr Vranckx commented that he would continue both aspirin and clopidogrel, along with the PPI, and keep the patient under high surveillance. Dr Chevalier said OFDI performed 1 month after the LAD PCI had shown relatively good strut coverage of 83.1%. The first baseline OFDI on the RCA had shown a proximal malposition in the distal lesion and a distal malposition in the proximal stent. A 4 mm balloon was inserted, and a second evaluation showed it had corrected the malapposition.

The medical team decided to stop the aspirin and start high-dose PPI with gastroscopic control and biopsy at 4 weeks. Clopidogrel alone was maintained for 3 months, as outlined in the study design. Evaluation at 3 months showed good coverage in both LAD and RCA. This is in line with overall results from the DISCOVERY 1TO3 trial (Figure 1), which has shown good strut coverage rates: 85.8±11.7% at 1 month, 89.0±9.9% at 2 months, and 95.7±4.4% at 3 months (p<0.001).[1]

Discussion Point 2: The Long-Term Prescription

The options were ramipril and rosuvastatin, clopidogrel, and/or PPI.

Dr Chevalier said he routinely checks sensitivity to clopidogrel with the platelet function analyser (PFA-100) system when aspirin is stopped. However, Dr Smits noted that the test is not widely available. Dr Colombo agreed, adding that testing is mainly used in special circumstances; he said he would continue clopidogrel in HBR patients because bleeding is prothrombotic and a second bleeding episode could cause thrombosis. Dr Valgimigli noted, however, that current guidelines give only a Class 2B–C recommendation for using the test in cases like the one under discussion, and a Class 3 recommendation for routine platelet function testing; he would continue with clopidogrel monotherapy. Dr Cuisset said response to clopidogrel has a clear impact on clinical outcome in the early post-PCI period, but for

stable patients the impact of the test on clinical outcome is weaker, suggesting it may not be useful in secondary prevention. Dr Chevalier clarified that PPI was added at the time of the bleeding event rather than at DAPT initiation, as the case study was before the introduction of new guidelines.[2]

Conclusions and Take-Home Message

Dr Smits concluded that the OFDI showed that most the of strut coverage took place in the first month after implantation of the Ultimaster stent in the DISCOVERY 1TO3 study.[1] Dr Chevalier noted that OFDI may help correct a hidden malapposition and that, even in non-HBR patients, the choice of a DES with quick strut coverage may help deal with a difficult situation. He also reminded the audience not to forget PPI as a preventive action.

Case 2: Bleeding or Clotting, Calculate the Risk

Doctor Pascal Vranckx

Case Description

Case 2 was an 84-year-old male who presented at the emergency department around 5 hours after MI, according to the ECG. He had a history of hypertension treated with an angiotensin-converting enzyme inhibitor in combination with a calcium antagonist, hypercholesterolaemia treated with a statin, and non-insulin-dependent diabetes mellitus treated with metformin. He was a former smoker and had chronic renal failure with a reduced estimated glomerular filtration rate of 42 mL/kg/1.73m^2. He had a haemoglobin level of 10.8 g/dL and white blood cell count of 7.2x10^9/L.

The patient had a bifurcation lesion (MEDINA 1.1.1) and was treated with a two-stent PCI.[3] Bleeding risk was weighed against thrombotic risk. In terms of the bleeding risk, risk factors included pre-existing anaemia, previous bleeding, age, and renal function. For the thrombotic risk, risk factors included age, renal function, and clinical presentation, ST-elevation MI (STEMI) versus non-STEMI, blood pressure, and heart rate.

There are different bleeding and thrombosis risk evaluation scores. In clinical practice, bleeding scores were used more often to evaluate bleeding risk, while thrombotic risk was rarely used. Only five members of the audience reported using a thrombotic risk score in routine clinical practice, more reported using a bleeding risk score, and only one member of the audience reported using both risk scores.

Dr Vranckx noted that bleeding translates into mortality, as demonstrated in a post-hoc analysis in the Tracer trial,[4] which mapped the cumulative mortality over the months since the bleeding for different BARC and Global Utilization of Streptokinase and Tpa for Occluded Arteries (GUSTO) bleeding criteria. All criteria translate into mortality risk, but the score determines the level of risk: mortality risk associated with GUSTO severe is 30% at 2 years, compared with <10% for a BARC2 bleed (Figure 2).

A major difference between the PRECISE-DAPT (Predicting bleeding complications in patients undergoing stent implantation and subsequent DAPT) score and the DAPT score, recommended by the European Society of Cardiology (ESC) guidelines,[2] is that PRECISE-DAPT allows calculation of risk at the time of index procedure, whereas the DAPT score is used after 12 months of uneventful treatment to calculate the risks of continuing with DAPT. The patient in this case study had high PRECISE-DAPT score.[5]

Discussion Point: Dual Antiplatelet Therapy Strategy Following Myocardial Infarction

The options were to treat for <6 months, 6 months, or 12 months, with a regimen including clopidogrel or ticagrelor.

Nobody in the audience said they would consider DAPT for 12 months with clopidogrel or with the more potent ticagrelor. The majority voted for DAPT for 6 months with either clopidogrel or ticagrelor. Two audience members would consider DAPT for <6 months. Dr Vranckx mentioned that this is the question being addressed by the MASTER DAPT trial.[6] Patients in MASTER DAPT received DAPT for 1 month and were then randomised to receive either single antiplatelet therapy (SAPT) for 11 months or DAPT for ≥5 months.

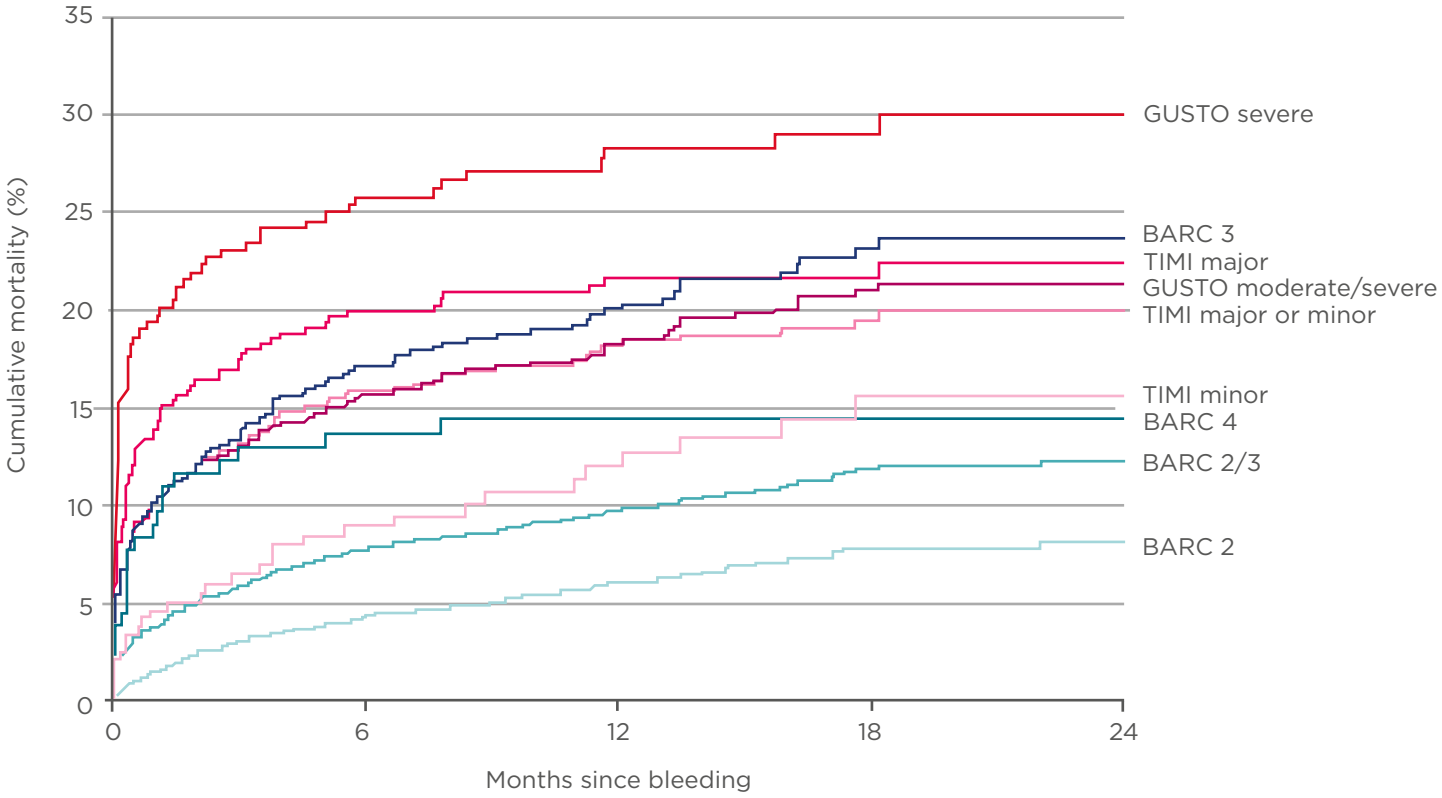

Figure 2: Mortality risk rises as the score on the BARC criteria increases.

BARC: Bleeding Academic Research Consortium; GUSTO: Global Utilization of Streptokinase and Tpa for Occluded Arteries; TIMI: thrombolysis in myocardial infarction.

Adapted from Vranckx et al.[4]

On the panel, Dr Cuisset said he would aim for optimal treatment for the early period because up to 80% of stent thrombosis cases occur within the first month of PCI. He would give aspirin and ticagrelor the first month and switch to the relatively weak $P2Y_{12}$ inhibitor clopidogrel, with aspirin, for up to 6 months.

Dr Valgimigli said that he would not de-escalate the potency of the $P2Y_{12}$ inhibitor but, rather, reduce the duration of DAPT. He would give aspirin and ticagrelor or aspirin and prasugrel for 1–3 months, followed by $P2Y_{12}$ inhibitor monotherapy. Since initial presentation was a STEMI, if the patient was stable, he would give clopidogrel rather than ticagrelor or prasugrel.

Dr Colombo commented that he would have given clopidogrel for at least 6 months because he would be more concerned about the bleeding risk and, without HBR, he might have continued it for 12 months. Using two stents in a bifurcation lesion is a good reason to use DAPT, and ticagrelor is a reasonable alternative to clopidogrel, he said. Because the stenting results are good, and current-generation stents have thin struts, the risk of thrombosis is <1% and clopidogrel should be sufficient; therefore, why subject the patient to the risk of bleeding? Dr Chevalier said this case is a good example of drug–device interaction. He would use clopidogrel if provisional stenting was successful; otherwise, two stents plus ticagrelor.

The team's choice was driven by the balance between bleeding and ischaemic risk and the patient was randomised for treatment in the MASTER DAPT study.[6] This is a randomised trial to compare, within current guidelines and instructions for use, an abbreviated versus a prolonged DAPT duration after bioresorbable polymer coated Ultimaster sirolimus-eluting stent implantation in patients presenting HBR features. The team decided that, if the patient was in the standard DAPT arm, they would be treated for 6 months with ticagrelor preferred

to clopidogrel because of the ischaemic risk. At 365 days post-randomisation, the patient had no bleeding or thrombotic problems.

Conclusions and Take-Home Message

Dr Vranckx concluded that DAPT reduces stent thrombosis and ischaemic events after PCI but increases the risk of bleeding. Since the risk factors for ischaemia and bleeding largely overlap (±20%), the duration of DAPT post-stenting should be driven by the balance between the two. The PRECISE-DAPT score, a standardised five-item risk score calculated at the time of the index PCI can provide a standardised tool for predicting out-of-hospital bleeding during DAPT.

Case 3: Should We Go Beyond Necessary?

Doctor Thomas Cuisset

Case description

Case 3 was a 62-year-old male with new-onset angina, CCS Grade II–III. The patient had a history of Type 2 diabetes mellitus, active smoking, and chronic alcohol abuse. He was taking metformin for the diabetes, but no antiplatelet therapy. According to the family, his adherence to metformin was irregular. Echocardiography showed good left ventricular EF (LVEF) function (65%) with no significant valvular disease; however, stress testing showed abnormalities in the inferior wall with significant ST changes >1 mm. Laboratory results showed good haemoglobin levels (12.7 g/dL), but platelet count was $120x10^9$/L. There was good renal function, moderate liver abnormalities, and no coagulation disorder. The cathlab found no significant lesion on either LAD or left coronary artery. There was also 60–70% stenosis of the RCA.

Discussion Point 1: Options for Revascularisation

The options were to offer optimal medical treatment rather than PCI; to first confirm the stress echo with invasive or non-invasive functional assessment instantaneous wave-free ratio and FFR; or to offer PCI of the RCA.

Just over half of the audience would carry out PCI, but a substantial minority would opt for optimal medical treatment; the risk of bleeding and of nonadherence to DAPT in this patient would support that approach. However, Dr Cuisset's team decided, because of the symptoms and documented ischaemia, to proceed with PCI of the RCA. HBR patients can be treated with new-generation DES, which allows for short or very short DAPT duration. He said FFR should not be over-used and was not necessary in a patient with single vessel disease and symptoms.

Discussion Point 2: Ad-hoc Versus Staged PCI and Antiplatelet Strategy

Having decided to offer PCI of the RCA, the options were:

1. Ad-hoc PCI with a loading dose of clopidogrel (600 mg) just after PCI. Discharge DAPT with aspirin plus clopidogrel.
2. Ad-hoc PCI with a loading dose of ticagrelor (180 mg) post PCI. Discharge DAPT with aspirin plus ticagrelor.
3. Staged PCI and take time to discuss with the patient and family. A loading dose of clopidogrel (600 mg) the day before PCI, and discharge DAPT with aspirin plus clopidogrel.
4. Staged PCI with more potent $P2Y_{12}$ inhibitor (e.g., ticagrelor 180 mg loading dose) the day before PCI, and discharge DAPT with aspirin plus ticagrelor.

There was no clear preference among the audience, but Option 1 attracted the most votes. Panellist Dr Vranckx chose Option 4 because the patient is an alcoholic with liver disease. Since clopidogrel is metabolised by the liver, he would choose a $P2Y_{12}$ inhibitor that bypasses it. Dr Valgimigli said this strategy is innovative, but, because the patient is relatively HBR with liver cirrhosis and thrombocytopenia above the cut-off point for bleeding, he would avoid ticagrelor or prasugrel and would give aspirin and clopidogrel instead. Dr Smits commented that since the lesion looked stable, he would also go for clopidogrel.

Option 1 was chosen, and the procedure was carried out ad-hoc without invasive functional imaging. The Ultimaster DES 2.75x15 mm was

implanted with good angiographic result. Ticagrelor was not chosen because of the HBR and because there is little evidence for the new $P2Y_{12}$ inhibitors in elective PCI in stable patients. Instead, a loading dose of 600 mg clopidogrel was given post PCI and the patient was discharged with aspirin plus clopidogrel.

Discussion Point 3: Dual Antiplatelet Therapy Duration at Discharge When Nonadherence is Likely

The options were a priori DAPT duration for 1 month, 3 months, 6 months, or longer. Most of the audience favoured 3 months for this patient at discharge; however, some opted for 1 month, others for 6 months.

On the panel, Dr Colombo said he would choose 3–6 months' DAPT, but his experience suggested the patient would stop all treatment after a week. He would use any new-generation stent, possibly a polymer-free stent or even bare-metal stent (BMS) for this short (<3 mm), single lesion with a low risk of restenosis of 15–20%. Dr Chevalier disagreed. He would choose a stent with quick coverage, such as Ultimaster DES, and 3 months DAPT, aiming to see the patient at 1 month to convince him to continue treatment. He said there is no role for BMS in any type of lesion now, even though they were used in the past. Dr Valgimigli said the evidence to support this point of view exists and the only study suggesting otherwise is NORSTENT.[7] His group is conducting a meta-analysis of data from >30,000 patients, including those in NORSTENT, randomly allocated to thin-strut BMS versus new-generation DES. The results are not yet available, but suggest that BMS should not be used.

Dr Cuisset agreed with the audience's decision to opt a priori for 3 months' DAPT. The MASTER DAPT study is ongoing but there is not yet evidence for a 1-month default strategy. The HBR patient of this case study was not at the same bleeding risk as a patient on anticoagulation, a very elderly patient, or someone with prior or active bleeding. Additionally, 6 months of DAPT was too long because of the clear risk of both bleeding and nonadherence.

Furthermore, the patient had mild thrombocytopenia (100–150x10^9/L), and a paper by McCarthy et al.[8] indicated that bleeding prevention in HBR patients, such as the one under discussion, should be done with PPI. Glycoprotein IIb and IIIa inhibitors should be avoided, low-dose aspirin should be given, and DAPT duration after new-generation DES should be shortened to 1–3 months. Also, a transradial approach with a new generation DES should be used. In light of this, Dr Cuisset's group used Ultimaster with 3 months' DAPT, as the strategy decided at discharge.

The patient and his family were educated on adherence and the patient's general practitioner was involved. A fixed-dose combination of aspirin and clopidogrel reduced the number of pills taken. Unfortunately, 6 weeks after PCI, the patient arrived in the emergency department, drunk, with trauma, minor bleeding, and a BARC2 bleeding complication. He described a skin haematoma since hospital discharge, which indicated that he had adhered to the DAPT.

Discussion Point 4: Dual Antiplatelet Therapy Strategy After a BARC2 Bleed

Options at this stage were to continue with the original 3-month DAPT strategy, stop aspirin and/or clopidogrel, or both. Alternatively, platelet testing could be used to aid the decision.

Some of the audience said they would continue with DAPT, and a similar number would stop aspirin alone; a few would stop the clopidogrel, and no one would stop both. A handful would like to use platelet function testing to test adherence.

Dr Cuisset said the patient's HBR, coupled with BARC1 and 2 level bleeding, which would further increase risk of nonadherence, led them not to continue their original strategy. Stopping either aspirin or clopidogrel without platelet function test could be a good compromise. Stopping both would leave the patient at risk of stenosis. The team therefore stopped clopidogrel, continuing aspirin as SAPT.

Conclusions and Take-Home Message

New-generation DES with short duration DAPT allowed for easier management of a challenging patient and many others with HBR. DAPT duration should be tailored according to the individual patient, the stent used, and the complexity of

the PCI. The DAPT strategy chosen immediately post PCI is a dynamic decision which should be adjusted according to the outcomes including the patient's drug tolerance.

Case 4: When the Number of Stents and Months of Dual Antiplatelet Therapy Should Not Match

Doctor Antonio Colombo

Introduction

Dr Colombo first stated that the long-term success of PCI depends on optimum antiplatelet therapy, a well-implanted stent, and good distal flow. The three variables need to be optimised; it is not recommended to compensate for a weakness in one by increasing the strength of another. In 1998, the first registry study to look at BMS implantation with single agent aspirin, found only two stent thromboses in the first week after stenting.[9] Aspirin alone would not now be considered in PCI, but the study shows the value of optimal implantation technique. More recently, meta-analyses of intravascular ultrasound (IVUS) versus angiography have shown that stent thrombosis is significantly reduced where IVUS is used rather than angiography.[10,11] Even so, IVUS is not used routinely.

Case Description

Case 4 was a 73-year-old male with a large thoracoabdominal aortic aneurysm (57 mm diameter), who had been referred by vascular surgeons. He had no prior history of bleeding, standard risk factors for CAD (hypertension, dyslipidaemia, ex-smoker), nothing remarkable in laboratory data (haemoglobin: 14.7 g/dL; creatinine: 1.13 mg/dL; estimated glomerular filtration rate: 49.1 mL/min/1.73m^2), reasonable EF (54%), and no significant valvular disease. The planned surgical operation was replacement of the aneurysm with a synthetic graft within a few weeks or months.

Angiography showed a stenotic lesion on the RCA (75%) that was not critical and could have been negative on FFR. There was a significant stenotic lesion (90%) on the mid LCX and total occlusion of the LAD.

Discussion Point 1: The Role of Preoperative Coronary Angiography

Preoperative coronary angiography was carried out in this case, which led to complex decision-making. One member of the audience said there is no evidence for patients undergoing non-cardiac surgery to have routine coronary angiography in the absence of symptoms; only patients with prognostic ischaemia on functional imaging and unstable angina symptoms should have angiography. Patients with aortic aneurysm are routinely treated with endovascular stenting under a spinal or even local anaesthetic, which precludes the need for general anaesthetic and extensive surgery. Once angiography has established that the patient has severe CAD, the situation is difficult; stenting only the straightforward lesions may not eliminate the patient's risk from general anaesthetic.

Co-chair Dr Valgimigli was not in favour of preoperative coronary angiography, but acknowledged that, in his institution, surgery would not go ahead without it. Dr Colombo added that the evidence on angiograms is lacking. He was not uneasy about preoperative angiograms because of the risk of myocardial infarction in patients operated on by vascular surgeons. Dr Cuisset commented that he would consider the angiogram only if a noninvasive test was positive.

Discussion Point 2: To Intervene or Not to Intervene

Following the angiography, the team's options ahead of the aortic aneurysm surgery planned in the following weeks or months were to not intervene, to treat the LAD and/or the LCX, and/or the RCA. Most of the audience would intervene, and most would treat the LCX. Dr Cuisset said, once he knew there was triple vessel disease, he would have minimised stenting and called the patient back after vascular surgery to do the second lesion. Dr Chevalier and Dr Colombo both said they would have stented the LCX and nothing else, but this is not what happened. It was decided to opt for LAD CTO recanalisation. After successful wire crossing, ASAHI Gaia Second (ASAHI INTECC

CO., LTD, Huddersfield, UK) and predilatation (1.25 mm and 2.5 mm), three stents were put on LAD, and the two-stent technique, guided by IVUS, was used on the LCX bifurcation. No FFR was carried out on the right coronary, but two stents were placed on the RCA. The operator was skilled and it was an excellent result; however, this patient had seven stents before undergoing planned surgery.

Discussion Point 3: Dual Antiplatelet Therapy Strategy Ahead of Vascular Surgery

There was little debate that DAPT was needed after such extensive stenting. The team's options were to give DAPT for 3 months, 6 months, or 1 year. Some in the audience opted for 3 months, others for 6 months.

Dr Colombo noted that surgery with three vessels open is not a bad idea if the stents are well endothelialised after 3, 4, or 5 months. DAPT was necessary but Dr Colombo said ticagrelor was not needed in this stable patient.

After the staged PCI, aspirin 100 mg and clopidogrel 75 mg were given for 1 month only and then stopped by the vascular team. Cardiac surgery for the thoracoabdominal aortic aneurysm was performed successfully with the patient off DAPT, and afterwards only clopidogrel was restarted. Dr Colombo disagreed with the approach and said that stopping both aspirin and clopidogrel after 1 month is risky. However, 1 week after the operation the patient was discharged without in-hospital thrombotic or bleeding complications.

Conclusions and Take-Home Message

For a patient with HBR, shorter duration of DAPT after PCI is appropriate. New-generation DES with more favourable properties for early endothelialisation including thinner struts, higher biocompatibility, or bioresorbable polymers, may allow shorter duration DAPT more safely. Optimal implantation techniques must be used to achieve the best possible results even with the most reliable device.

Conclusion

Complex decisions on DAPT strategy must be taken in practice. Patients need to be protected from bleeding and ischaemic risks; these risks guide decision-making on DAPT strategy. Risks can be predictable or non-predictable, but even where a high risk of bleeding or ischaemic recurrence is predicted, the treatment paradigm is only changed where there is clear evidence that, by doing so, the risk would be modified. Currently there is insufficient evidence to guide DAPT treatment in challenging scenarios such as in HBR patients. New-generation DES with fast strut coverage might allow short DAPT duration after PCI. An ongoing randomised trial (MASTER DAPT) in HBR patients comparing an abbreviated versus a prolonged DAPT duration after implantation of a new-generation DES, will provide further evidence to help address this challenging clinical question.[6]

References

1. Chevalier B et al. Serial assessment of strut coverage of biodegradable polymer drug-eluting stent at 1, 2, and 3 months after stent implantation by optical freqeuency domain imaging The DISCOVERY 1TO3 study (evaluation with OFDI of strut coverage of Terumo new drug eluting stent with biodegradable polymer at 1, 2, and 3 months). Circ Cardiovasc Interv. 2017;10(12):e004801.
2. Valgimigli M et al. 2017 ESC focussed update on DAPT in Coronary Artery Disease, developed in collaboration with EACTS. Eur J Cardiothorac Surg. 2017;53(1):34-78. 3. Sawaya FJ et al. Contemporary approach to coronary bifurcation lesion treatment. JACC Cardiovasc Interv. 2016;9(18):1861-78.
3. Sawaya FJ et al. Contemporary approach to coronary bifurcation lesion treatment. JACC Cardiovasc Interv. 2016;9(18):1861-78.
4. Vranckx P et al. Validation of BARC bleeding criteria in patients with acute coronary syndromes: The TRACER trial. J Ann Coll Cardiol. 2016;67(18):2135-44.
5. PRECISEDAPT. Available at: www.precisedaptscore.com. Last accessed: 25 June 2018.
6. ECRI. Management of high bleeding risk patients post bioresorbable polymer coated stent implantation with an abbreviated versus prolonged dapt regimen (MASTER DAPT). NCT03023020. https://clinicaltrials.gov/ct2/show/NCT03023020.
7. Bønaa KH et al. Drug-eluting or bare-metal stents for cornonary artery disease. N Engl J Med. 2016;375:1242-52.
8. McCarthy CP et al. The management of antiplatelet therapy in acute

coronary syndrome patients with thrombocytopenia: A clinical conundrum. Eur Heart J. 2017;38(47):3488-92.

9. de Jaegers et al. Intravascular ultrasound-guided optimized stent deployment: Immediate and 6 months clinical and angiographic results from the Multicenter Ultrasound Stenting in Coronaries Study (MUSIC study). Eur Heart J. 1998;19(8):1214-23.

10. Zhang VJ et al. Comparison of intravascular ultrasound-guided versus angiography guided drug eluting stent implantation: A systematic review and meta-analysis. BMC Cardiovascuar Disorders. 2015;15:153.

11. Elgendy IY et al. Outcomes with intravascular ultrasound guided. Circ Cardiovasc Interv. 2016;9(4):e003700.

Abstract Reviews

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BVS STEMI STRATEGY-IT: 1-Year Results Following a Pre-Specified Absorb Implantation Strategy in ST-Segment Elevation Myocardial Infarction

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ST-segment elevation myocardial infarction (STEMI) can represent a suitable scenario for the use of bioresorbable vascular scaffold technologies because of the specific characteristics of STEMI patients (e.g., young age) and lesions (usually soft plaque with a necrotic core). Data from initial clinical experiences with a polymeric everolimus-eluting bioresorbable stent (BRS) (Absorb BVS®, Abbott Vascular, Chicago, Illinois, USA) in STEMI raised concerns among clinicians about the device safety because a noteworthy scaffold thrombosis (ScT) rate was reported at early, mid, and long-term (up to 3 years) follow-up after primary percutaneous coronary intervention (pPCI).[1-3] Technical issues specifically related to the structural Absorb BRS features (e.g., thick polymeric struts and maximal post-expansion scaffold limits), as well as aspects related to the resorption process were advocated as probable causes for the BRS-related events reported. Nevertheless, prespecified technical suggestions of how to perform an optimal Absorb procedure in STEMI patients were lacking in each of the studies performed to date. Results from a multicentre, Italian, prospective evaluation of a standardised Absorb implantation strategy in 505 STEMI patients (17% of the overall population screened during the study period) suggested that the procedure was both feasible and associated with lower 30-day device-oriented composite endpoint (DOCE) and ScT rates compared to previous studies on the same topic.[4,5]

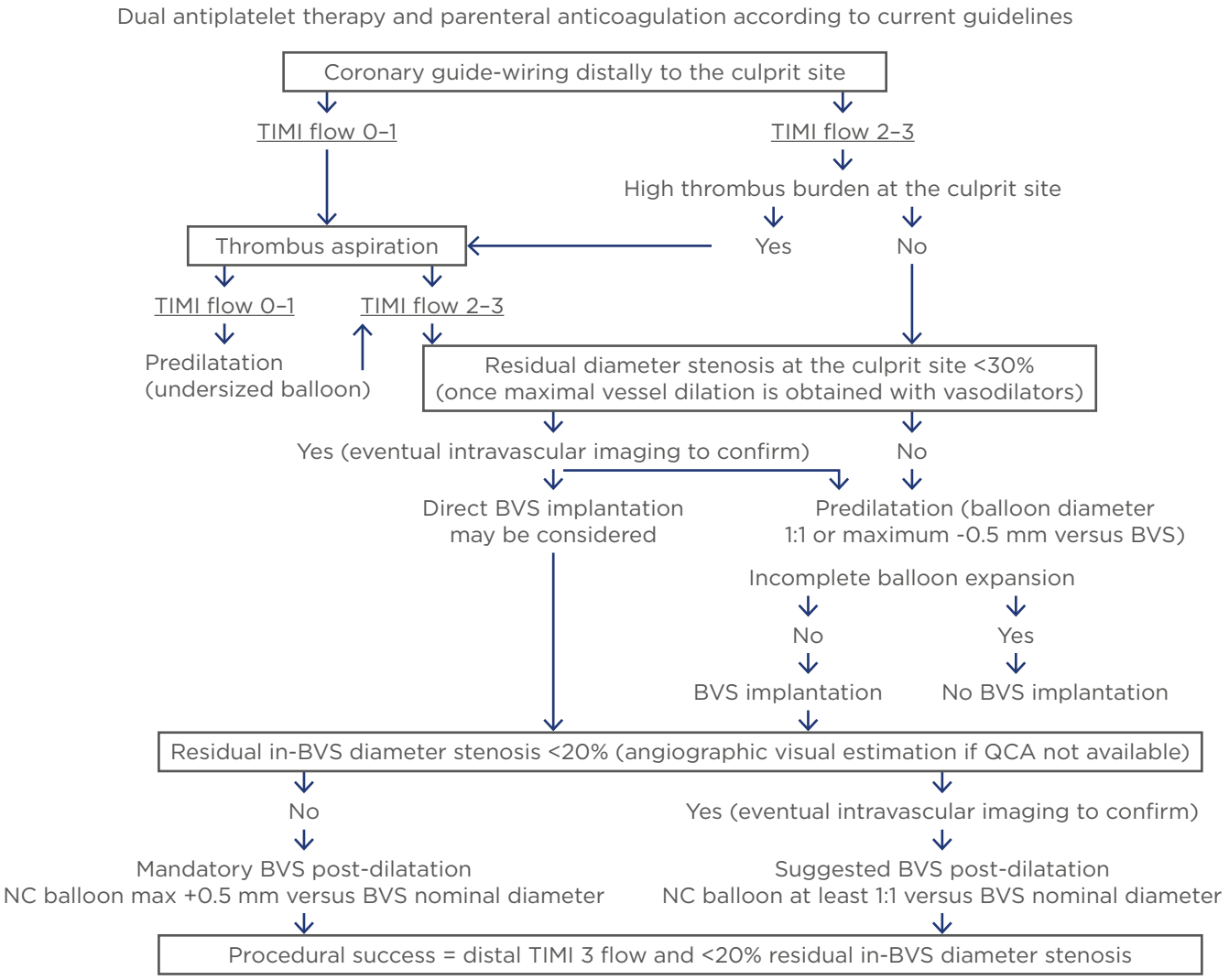

Figure 1: The proposed management of a ST-segment elevation myocardial infarction patient undergoing primary percutaneous coronary intervention with Absorb implantation.

BVS: bioresorbable vascular scaffold; NC: non-compliant; QCA: quantitative coronary angiography; TIMI: thrombolysis in myocardial infarction.

Adapted from Ielasi et al.[4]

Although Absorb is no longer available on the market, further follow-up data are needed to understand the role of a specific BRS strategy (i.e., patient or lesion selection, implantation technique, and dual antiplatelet therapy regimen) in preventing BRS-related adverse events.

On this basis, the authors sought to assess the 1-year follow-up results following a prespecified Absorb implantation strategy in STEMI patients undergoing pPCI (Figure 1). According to the study protocol, direct Absorb implantation was feasible in 47 (9.3%) patients, while post-dilatation was performed in 468 (92.7%) cases, of whom 60.0% with an oversized (maximum diameter +0.5 mm compared to the Absorb nominal diameter implanted) non-compliant balloon. The hierarchical DOCE rate at 1-year follow-up was 1.2% (0.4% cardiac death, 0.4% target-vessel myocardial infarction, and 0.8% ischaemia-driven target lesion revascularisation) versus 0.6% at 30-day follow-up. Two episodes (0.4% of patients) of ScT (one probable subacute and one late definite) were reported. At 1-year follow-up, 99.2% of patients were on dual antiplatelet therapy (95% with ticagrelor or prasugrel). The limitations of this study include the observational nature, the lack of a

direct comparison versus a current-generation drug-eluting stent, the short follow-up period, and the relatively selected STEMI cohort that precludes the generalisation of the outcomes reported in an all-comers STEMI population; however, the authors concluded that the prespecified Absorb implantation strategy in STEMI patients was associated with consistent low DOCE and ScT rates at 1-year follow-up. Longer term follow-up (3 and 5-year) is needed to assess the role of this strategy in preventing very late adverse events.[6]

References

1. Brugaletta S et al. Absorb bioresorbable vascular scaffold versus everolimus-eluting metallic stent in ST-segment elevation myocardial infarction: 1-year results of a propensity score matching comparison: The BVS-EXAMINATION Study (bioresorbable vascular scaffold-a clinical evaluation of everolimus eluting coronary stents in the treatment of patients with ST-segment elevation myocardial infarction). JACC Cardiovasc Interv. 2015; 8(1 Pt B):189-97.
2. Fam JM et al. Initial experience with everolimus-eluting bioresorbable vascular scaffolds for treatment of patients presenting with acute myocardial infarction: A propensity-matched comparison to metallic drug eluting stents 18-month follow-up of the BVS STEMI first study. EuroIntervention. 2016;12(1):30-7.
3. Moscarella E et al. Clinical findings after bioresorbable vascular scaffold implantation in an unrestricted cohort of patients with ST-segment elevation myocardial infarction (from the RAI registry). Int J Cardiol. 2018;258:50-4.
4. Ielasi A et al. A prospective evaluation of a standardized strategy for the use of a polymeric everolimus-eluting bioresorbable scaffold in ST-segment elevation myocardial infarction: Rationale and design of the BVS STEMI STRATEGY-IT study. Catheter Cardiovasc Interv. 2017;89(7):1129-38.
5. Ielasi A et al. A prospective evaluation of a pre-specified absorb BVS implantation strategy in ST-segment elevation myocardial infarction: The BVS STEMI STRATEGY-IT study. JACC Cardiovasc Interv. 2017;10(18):1855-64.
6. Azienda Ospedaliera Bolognini di Seriate Bergamo. Use of BVS in ST-segment Elevation Myocardial Infarction (STEMI): The BVS STEMI STRATEGY-IT Prospective Registry (STRATEGY-IT). NCT02601781. https://clinicaltrials.gov/ct2/show/NCT02601781.

BVS EXPAND: Registry Turns 5 Years Old and Brings First Real Long-Term Results for the Everolimus-Eluting Bioresorbable Stent in Clinical Practice

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Keywords: Bioresorbable vascular scaffold, long-term outcomes, percutaneous coronary interventions, scaffold thrombosis.

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The everolimus-eluting bioresorbable stent (BRS) Absorb BVS® (Abbott Vascular, Chicago, Illinois, USA), which is still considered the most widely implanted BRS worldwide, was introduced initially as a novel interventional coronary device designed to perform the functions of a metallic drug-eluting stent (DES) and resorb over a period of 2–3 years, leaving no nidus for late ischaemic or thrombotic events. While initial results from the first in-human studies involving relatively simple lesions were favourable,[1,2] cautionary findings

have since emerged in later studies showing an increased risk of target vessel myocardial infarction and device thrombosis compared to the everolimus-eluting DES (Xience®, Abbott Vascular).[3,4] Since long-term data after full resorption (>3 years) for the Absorb BVS are only available from studies with carefully selected patients, long-term results of the Absorb BVS implanted in the routine clinical setting are still required to provide further insights into the performance of this device in a real-world situation.

The mid-term outcomes of the device implanted in a real-world population have been described in the BVS EXPAND registry.[5] BVS EXPAND is an investigator-initiated, prospective, single-centre, single-arm study performed in an experienced tertiary percutaneous coronary intervention centre. Patients presenting with non-ST-segment elevation myocardial infarction (NSTEMI), stable or unstable angina, or silent ischaemia caused by a *de novo* stenotic lesion in a native previously untreated coronary artery with intention to treat using a bioresorbable vascular stent were included. Patients with complex lesions, such as bifurcation, calcified (as assessed by angiography), long, and thrombotic, were also included. The exclusion criteria were a history of coronary bypass grafting, presentation with cardiogenic shock, bifurcation lesions requiring kissing balloon post-dilation, ST-segment elevation myocardial infarction (STEMI), allergy or contraindications to antiplatelet therapy, an expected survival of <1 year, and fertile female patients not taking adequate contraceptives or currently breastfeeding. As per hospital policy, patients with a previously implanted metal DES in the intended target vessel were also excluded. In additon, although old age was not an exclusion criterion, in general BVS were reserved for younger patients, and implantation was dependent on the operator's interpretation of biological age.

A total of 249 patients with 335 lesions treated with 445 scaffolds were studied and the mean age of patients was 61.3 years. The lesions treated were long (22.1±13.9 mm) and complex (bifurcation lesion was present in 21.3% of patients). The clinical device and procedural successes were 97.3% and 96.8%, respectively, and at 18 months, overall death and myocardial infarction rates were 1.3% and 3.4%, respectively. Target lesion revascularisation (TLR) at 18 months was performed in 3.4% of patients and the rate of nontarget vessel revascularisation at 18 months was 3.7%. The rate of overall scaffold thrombosis (ST) at 18 months was 1.7%, with a definite ST rate of 1.9%. Over 50% of patients had a minimum follow-up of 4 years, with a median follow-up of 1,458 days. At 60 months, overall Kaplan–Meier estimates for death and myocardial infarction were 4.9% and 7.4%, respectively. TLR at 60 months was performed in 7.8% of patients and the rate of nontarget vessel revascularisation at 60 months was 7.4%. Kaplan–Meier estimates for definite or probable ST were 2.1% at 60 months, with the rate of definite ST remaining constant at 1.3% at 60 months.

In this study, the authors observed a low TLR and ST rate for the Absorb BVS beyond 36 months. This supports the concept of the BRS and merits the development of a next-generation BRS with improved device characteristics to reduce early device-related events. In conclusion, after early device-related events, very late TLR and ST were observed in the first 5-year prospective registry of the everolimus-eluting BRS in clinical practice. Therefore, low event rates after full BRS resorption are feasible; however, longer-term follow-up is still required to assess the long-term results and benefits of BRS.

References

1. Ormiston JA et al. A bioabsorbable everolimus-eluting coronary stent system for patients with single de-novo coronary artery lesions (ABSORB): A prospective open-label trial. Lancet. 2008;371(9616):899-907.
2. Serruys PW et al. Evaluation of the second generation of a bioresorbable everolimus drug-eluting vascular scaffold for treatment of de novo coronary artery stenosis: Six-month clinical and imaging outcomes. Circulation. 2010;122(22):2301-12.
3. Serruys PW et al. Comparison of an everolimus-eluting bioresorbable scaffold with an everolimus-eluting metallic stent for the treatment of coronary artery stenosis (ABSORB II): A 3 year, randomised, controlled, single-blind, multicentre clinical trial. Lancet. 2016;388(10059):2479-91.
4. Kereiakes DJ et al.; ABSORB III Investigators. 3-Year clinical outcomes with everolimus-eluting bioresorbable coronary scaffolds: The ABSORB III Trial. J Am Coll Cardiol. 2017;70(23):2852-62.
5. Felix CM et al. Mid- to long-term clinical outcomes of patients treated with the everolimus-eluting bioresorbable vascular scaffold: The BVS Expand Registry. JACC Cardiovasc Interv. 2016;9(16):1652-63.

Speckle-Tracking Echocardiography Detects Improvements in Regional Left Ventricular Longitudinal Deformation After Chronic Total Occlusion Recanalisation

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Keywords: Chronic total occlusion (CTO), left ventricular function, longitudinal strain (LS).

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There is some controversy regarding left ventricular ejection fraction (LVEF) improvement after chronic total occlusion (CTO) recanalisation. While a meta-analysis of observational studies reports an average improvement of 4.4%,[1] there is only one randomised clinical trial to demonstrate a benefit in the subgroup of patients with CTO of the left anterior descending artery.[2]

However, should LVEF improvement be expected after a single-vessel percutaneous coronary intervention (PCI)? Does it matter if this PCI is performed over a CTO regarding LVEF improvement? Maybe not. Moreover, we know from several registries that ≥50% of CTO patients have normal LVEF, so no relevant LVEF improvements might be expected in those patients.

Longitudinal strain (LS), which is measured by two-dimensional speckle-tracking and represents myocardial deformation, is easily quantified in a semiautomatic fashion. It has independent prognostic value in a wide array of cardiac diseases, and might identify viable myocardium in ischaemic heart disease. We explored whether several LS parameters could be superior to conventional echocardiographic parameters in assessing LV function in CTO patients. Taking a 16-segment LV model from 13 consecutive, successful CTO PCI patients, a total of 208 segments were assessed.

No changes in global LVEF, telediastolic diameter, or mitral peak velocity of early filling to early diastolic mitral annular velocity ratio (E/E′) were detected at 1 or 3-month follow-up (56.0±6.0% at baseline versus 59.0±6.0% at 3-month follow-up; p=0.2; telediastolic diameter 54.8±26.0 mm versus 59.7±25.0 mm; p=0.6; and E/E′ 12.6±4.3 versus 11.8±3.8). Deformation parameters from CTO dependent or nondependent segments remained unchanged at 1-month follow-up (nonsignificant). At 3-month follow-up, the strain of CTO-dependent segments improved significantly: S-epicardial Δ -2.6±5.2; p<0.001; S-mesocardial Δ -2.3±5.2; p<0.05; and S-endocardial Δ -2.1±5.6; p<0.05. However, strain rate (SR) in CTO-dependent segments had no differences at 3-month follow-up: SR Δ -0.05±0.42; p=0.353. As expected, CTO nondependent segments did not change significantly.

In conclusion, this pilot study suggests that regional LS improves in CTO-dependent segments after successful PCI, while global LVEF, E/E', and SR remain unchanged. Changes were not present after 1 month but became evident after 3 months. The discussion after the abstract presentation opened several questions to be answered with a greater number of patients and further follow-up. Future implications are the potential for LS to predict viability with incremental value over cardiac magnetic resonance, clinical implications of regional LV function improvement (such as better exercise tolerance), and clinical outcomes.

References

1. Hoebers LP et al. Meta-analysis on the impact of percutaneous coronary intervention of chronic total occlusions on left ventricular function and clinical outcome. Int J Cardiol. 2015;187:90-6.
2. Henriques JP et al.; EXPLORE trial investigators. Percutaneous intervention for concurrent chronic total occlusions in patients with STEMI: The EXPLORE trial. J Am Coll Cardiol. 2016;68(15):1622-32.

The MATISSE Study: Clinical Performance of Self-Apposing Stent for Left Main Disease

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Recent randomised studies have shown that, when deploying the most commonly used stent, the outcome of percutaneous coronary intervention (PCI) of the left main coronary artery (LMCA) is similar to the outcomes resulting from coronary artery bypass in patients with a broad range of SYNTAX scores.[1]

The devices usually implanted are all balloon-expandable regardless of their composition, meaning they may reach the final diameter of their own balloon or the one used for post-dilatation. Stentys® (Stentys, Paris, France) is a self-expandable nitinol (an alloy of nickel and titanium) device. It has a feature that enables its dimensions to be increased until it reaches the vessel wall; this feature, along with its cylindrical shape, makes it particularly appealing for the treatment of tapered vessels, such as the distal LMCA.[2] Since data regarding the clinical outcome of this device in this particular setting are scarce, we designed the MATISSE study, a retrospective, spontaneous, multicentre registry that enrolled all patients treated with the self-expandable sirolimus-eluting Stentys for the treatment of LMCA disease at 10 international PCI-expert centres.[3]

The co-primary study endpoints were procedural success, defined as angiographic success without the occurrence of adverse events during hospitalisation, and device-orientated adverse cardiac events (DOCE), a composite endpoint of cardiac death, target lesion revascularisation, and target-vessel myocardial infarction, at a minimum of 6 months clinical follow-up. Angiographic success was defined as final thrombolysis in myocardial infarction (TIMI) 3 flow in both branches, and final stenosis <20% in the main branch and <50% in the secondary branch. Secondary endpoints were the single components of DOCE and stent thrombosis.

Between January 2014 and September 2016, a total of 151 patients (16%) were enrolled in the MATISSE study. Lesions were located in the distal LMCA bifurcation in 84% of patients. Procedural success, the primary endpoint, was achieved in 150 patients. At an average follow-up of 239±161 days, DOCE occurred in 13 patients (8.6%), with 2 (1.3%) cardiac deaths. Target lesion revascularisation occurred in 7 patients (4.6%). There were two cases of definite stent thrombosis: one was acute and one was very late.

With our study, we showed that the mid-term outcome of a real-world population treated with this device is comparable to best-in-class balloon-expandable stents;[1] the results of the MATISSE registry are, indeed, in line with the EXCEL study in terms of acute procedural success and clinical outcome.

Since percutaneous treatment of the LMCA is challenging from a technical point of view, we argue that a self-expandable stent may share some potential advantages, in particular:

- Often, LMCA lesions involve a bifurcation with a relevant branch, and the characteristics of this device, not requiring a final kissing balloon inflation, make bifurcation management easier.
- In distal LMCA lesions, wherein the stent is required to protrude in the left anterior descending or circumflex artery, the discrepancy between the proximal and distal segments of the vessel makes a self-apposing, tapered stent particularly appealing.

› There is a reduced risk of stent under-expansion and malapposition.[4-6]

In conclusion, our study showed that PCI of the LMCA in a complex patient population is feasible and associated with good clinical outcome with a dedicated device at mid-term follow-up.

References

1. Stone GW et al.; EXCEL Trial Investigators. Everolimus-eluting stents or bypass surgery for left main coronary artery disease. N Engl J Med. 2016;375(23):2223-35.
2. Kumar N et al. Single-centre experience of STENTYS Xposition S in treatment of left main stem lesions. Expert Rev Med Devices. 2017;14(7):577-82.
3. Cortese B et al. Clinical performance of a dedicated self-apposing stent for the treatment of left main stem disease. Results of the left Main AngioplasTy wIth a Self-apposing StEnt - The MATISSE study. Cardiovasc Revasc Med. 2018. [Epub ahead of print].
4. Kim YH et al. Effectiveness of drug-eluting stent implantation for patients with unprotected left main coronary artery stenosis. Am J Cardiol. 2008;101(6):801-6.
5. Oviedo C et al. Intravascular ultrasound classification of plaque distribution in left main coronary artery bifurcations: Where is the plaque really located? Circ Cardiovasc Interv. 2010;3(2):105-12.
6. Buccheri D et al. Drug-eluting stent treatment of left main coronary artery disease: The case for a sirolimus-eluting, autoexpandable alternative. An optical coherence tomography analysis. Int J Cardiol. 2015;199:119-20.

Clinical and Angiographic Predictors of Late Lumen Growth in the Distal Vessel After Chronic Total Occlusion Revascularisation

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Keywords: Chronic total occlusion (CTO), late lumen enlargement, percutaneous coronary intervention.

Citation: EMJ Int Cardiol. 2018;6[1]:48-49. Abstract Review No. AR5.

BACKGROUND

Behind the technical difficulties involved in the percutaneous recanalisation of coronary chronic total occlusions (CTO), a complex scenario of physiopathological mechanisms are responsible for various modifications that affect the vessel. In fact, after successful CTO revascularisation, the segment distal to the CTO undergoes physiological changes, with documented increases in vessel diameters when control angiography is performed at follow-up. The aim of this investigation was to identify the clinical and angiographic predictors of this phenomenon.

METHODS

The PRISON III[1] and IV[2] trials, which enrolled patients with successfully recanalised CTO treated with drug-eluting stent implantation, were used as the data source for this study. Quantitative coronary analysis (QCA) was performed immediately after the baseline procedure and at 8–9 months follow-up, to specifically address the characteristics of the segment distal to the CTO lesion. Measures included mean lumen diameter (MeanLD), minimal lumen diameter (MLD), reference vessel diameter, and minimal and mean lumen gain (MeanLG). The primary endpoint of this analysis was to identify basal angiographic features and clinical characteristics associated with higher increase in MeanLD and MLD.

RESULTS

A total of 425 patients were suitable for QCA at baseline and follow-up procedures. Mean length

of the distal segment analysed was approximately 40 mm. Baseline QCA disclosed a MeanLD of 1.97±0.49 mm and a MLD of 1.33±0.53 mm. Binary stenosis was detected in 167 (39.3%) patients. Follow-up QCA showed an increase in all measures (MeanLG 0.42±0.35 mm and minimal lumen gain of 0.54±0.45 mm). A lumen gain >0.1 mm was observed in 351 (82.6%) patients. Moreover, 151 out of 167 (90.4%) patients with binary stenosis at baseline showed regression of the lesion at follow-up. Association between baseline variables and a significant MeanLG was investigated by means of univariate and multivariate analysis. At univariate analysis, age, smoking, the use of diuretics, the presence of collaterals channels, and basal MLD were predictors of significant MeanLG at angiographic follow-up. Once entered in the multivariate algorithm, however, only the use of diuretics (odds ratio [OR]: 2.62, 95% confidence interval [CI]: 1.12–6.15; p=0.02), baseline MLD (OR: 0.22, 95% CI: 0.12–0.39; p=<0.001), and presence of collaterals and channels (OR: 2.75, 95% CI: 1.35–5.61; p=0.005) were confirmed predictors of significant MeanLG (Figure 1).

CONCLUSION

Our results confirm that the segment downstream of the CTO lesions undergoes relevant increases in diameter in most cases if follow-up angiography is performed. Major predictors of late lumen increase are the use of diuretics, the presence of collateral channels, and the basal MLD in the same segment after the baseline procedure.

References

1. Teeuwen K et al. Three-year clinical outcome in the primary stenting of totally occluded native coronary arteries III (PRISON III) trial: A randomised comparison between sirolimus-eluting stent implantation and zotarolimus-eluting stent implantation for the treatment of total coronary occlusions. Eurointervention. 2015;10(11):1272-5.
2. Teeuwen K et al. Randomized multicenter trial investigating angiographic outcomes of hybrid sirolimus-eluting stents with biodegradable polymer compared with everolimus-eluting stents with durable polymer in chronic total occlusions: The PRISON IV trial. JACC Cardiovasc Interv. 2017;10(2):133-43.

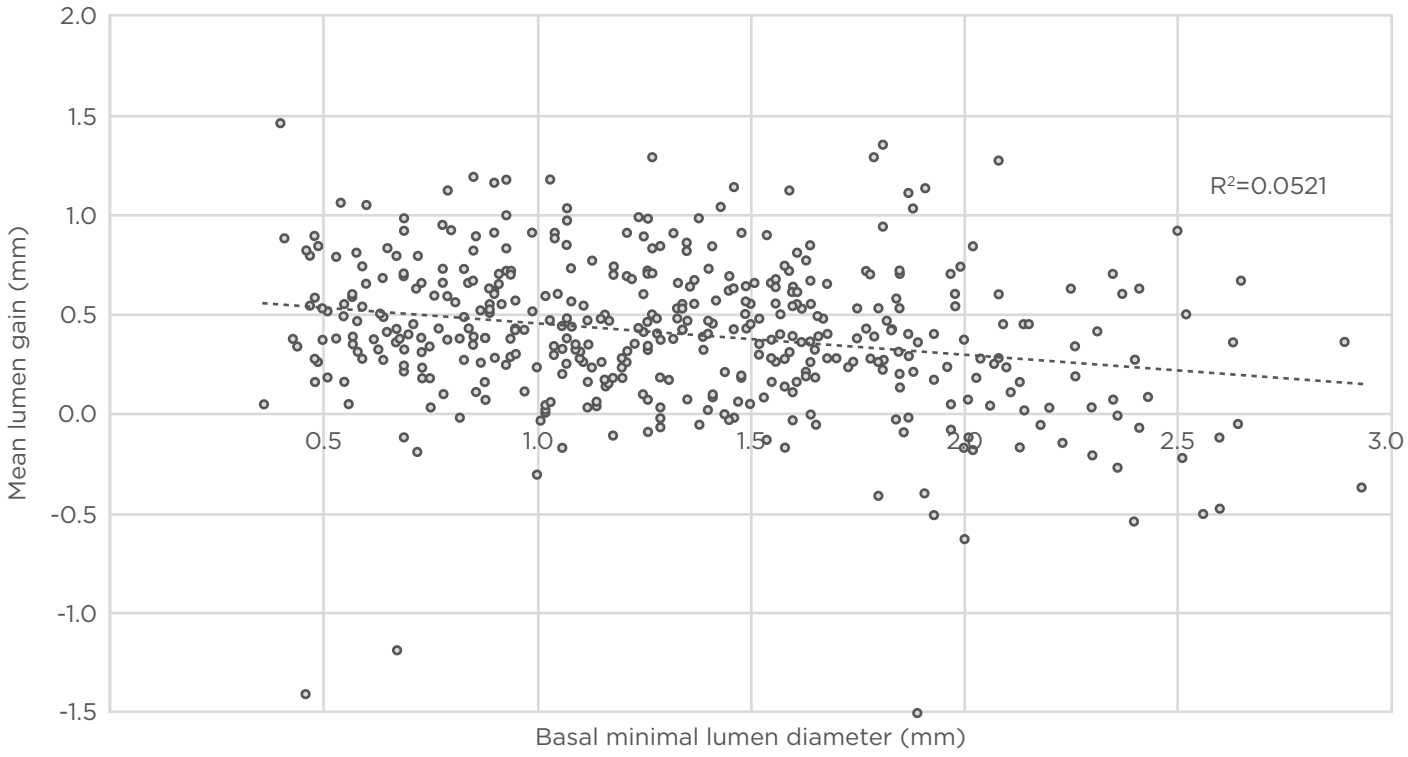

Figure 1: Correlation between basal minimal lumen diameter and mean lumen gain as observed at follow-up procedure.

Influence of Permanent Pacemaker Implantation After Transcatheter Aortic Valve Implantation with the New-Generation Devices on Mortality and Clinical Outcome Within 1 Year

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Keywords: Outcome, new-generation devices, permanent pacemaker implantation (PPMI), transcatheter aortic valve implantation (TAVI).

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AIMS

Permanent pacemaker implantation (PPMI) is the most common complication after transcatheter aortic valve implantation (TAVI). New-generation TAVI devices, despite their improved outcomes concerning paravalvular aortic regurgitation and vascular access complications, have remaining high pacemaker implantation rates. There is evidence of an association between chronic right ventricular pacing and the occurrence of heart failure in non-TAVI patients based on the MOST[1] and DAVID[2] trials; it is believed that this may be translated to the outcomes of elderly patients with PPMI after TAVI. The impact of PPMI on mortality and clinical outcome in TAVI patients is still a matter of debate, and data on new generation devices in this regard are scarce. Therefore, the authors sought to analyse the influence of PPMI after TAVI with new generation devices on mortality as well as on clinical outcome in a large all-comers patient collective within a 12-month period.

METHODS AND RESULTS

We enrolled 683 consecutive patients undergoing transfemoral TAVI for treatment of symptomatic severe aortic stenosis. Implantation took place between February 2014 and September 2016. Patients with pacemakers prior to TAVI were excluded from the analysis, leaving 607 patients for evaluation. Baseline characteristics of patients with PPMI or without PPMI after TAVI were compared, along with clinical outcomes after hospital discharge at 30 days and 1 year, with the primary endpoint being all-cause mortality. We further evaluated secondary endpoints, a combined endpoint of major adverse events (MAE), including cardiac and cerebral events, bleeding complications, and valve function-related events, as well as rehospitalisation due to valve-related symptoms and heart failure. Follow-up was obtained by a clinical visit or by phone contact.

The implanted new-generation TAVI devices were the balloon-expandable Edwards SAPIEN 3 valve (ES3) (Edwards Lifesciences, Irvine, California, USA) (58.5%), the mechanically expanded LOTUS™ and LOTUS™ Edge valve (Boston Scientific, Marlborough, Massachusetts, USA) (37.1%), and the self-expandable CoreValve Evolut R (Medtronic, Minneapolis, Minnesota, USA) (4.4%). PPMI became necessary in 165 patients (24.2% of the overall population). Baseline characteristics of patients were comparable between both groups. The rate of the LOTUS valve was significantly higher in patients who had PPMI after TAVI (59.4% versus 28.7%; p<0.01), whereas the rate of the ES3 valve was significantly higher in patients without PPMI after TAVI (66.1% versus 38.2%; p<0.01). There was no significant difference in 30-day and 1-year outcomes concerning all-cause mortality (PPMI versus no-PPMI, 30-days: 0.6% versus 0.9%; p=0.71; 1-year: 10.4% versus 12.0%; p=0.61), rate of the combined endpoint of adverse events (30 days: 2.4% versus 3.9%; p=0.39; 1 year: 21.7% versus 22.9%; p=0.76), or the need for rehospitalisation (30 days: 1.8% versus 2.8%; p=0.51; 1 year: 15.2% versus 15.8%; p=0.87).

Since the potential negative effect of right ventricular pacing is more likely to be serious in patients with reduced ejection fraction, a subanalysis of patients with a reduced ejection fraction of <45.0% was conducted. In this group, there was no statistically significant difference in outcome concerning all-cause mortality (PPMI versus no-PPMI: 11.1% versus 15.7%; p=0.56) or rate of the combined endpoint of adverse events, which showed a numerical difference, although this was not statistically significant, potentially because of the small number of patients with EF <45.0% (no-PPMI versus PPMI: 14.8% versus 26.5%; p=0.21).

Furthermore, we conducted a multivariate logistic regression analysis including known or assumed risk factors of 1-year all-cause mortality, and this did not reveal PPMI to be independently associated with 1-year mortality (odds ratio: 0.79; 95% confidence interval: 0.41–1.54; p=0.49).

CONCLUSION

In our large cohort of TAVI patients treated with the new generation devices, PPMI after TAVI did not have an impact on all-cause mortality, rate of a combined endpoint of adverse events, hospitalisation due to valve-related symptoms, or heart failure within a 1-year follow-up. However, since the potential negative impact of PPMI on outcomes after TAVI might need more time to become obvious, longer follow-ups are necessary to come to a definite conclusion on this matter. These data are important, since with the tendency towards the treatment of younger and lower-risk patients the impact of PPMI on outcome needs to be considered in the discussion on whether or not to treat these new patient groups with TAVI.

References

1. Sweeney MO et al. Adverse effect of ventricular pacing on heart failure and atrial fibrillation among patients with normal baseline QRS duration in a clinical trial of pacemaker therapy for sinus node dysfunction. Circulation. 2003;107(23):2932-7.
2. Wilkoff BL et al. Dual-chamber pacing or ventricular backup pacing in patients with an implantable defibrillator: The Dual Chamber and VVI Implantable Defibrillator (DAVID) Trial. JAMA. 2002;288(24):3115-23.

GISE Registry of Transcatheter Treatment of Mitral Valve Regurgitation (GIOTTO): Epidemiology and Acute Results

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Keywords: Heart failure, MitraClip®, mitral valve regurgitation, percutaneous mitral valve repair.

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The GISE Registry of Transcatheter Treatment of Mitral Valve Regurgitation (GIOTTO) is a prospective Italian registry designed to collect current, real-world procedural and clinical data on early and long-term outcomes of patients treated with MitraClip® (Abbott, Chicago, Illinois, USA) implantation. The enrolment started in February 2016 in 22 centres. From February 2016 to May 2018, 1,041 consecutive patients were enrolled in the 22 participating centres (66.4% males, n=622; mean age: 74.2±9.6 years); the target enrolment was 1,200 patients. The main

aetiology was functional mitral regurgitation (FMR) (74.9%, n=780) and the remaining 261 patients (25.1%) had degenerative MR (DMR).

The majority of the cohort was highly symptomatic (New York Heart Association [NYHA] Class III [71.0%] or Class IV [11.6%]) and approximately 45.0% had coronary artery disease, 38.0% had a previous myocardial infarction, and 77.2% had a left ventricular ejection fraction <50.0%. About 65.0% of the patients had at least one episode of acute heart failure leading to hospitalisation within the previous 12 months, with a mean number of in-hospital days of 15.9±13.8.

The majority of patients >80 years old had DMR (60.9% versus 24.1% with FMR; p<0.001); 15% of patients exhibited mixed disease. Compared to FMR, patients with DMR were older (73±9 versus 79±9 years, respectively; p<0.001), with higher ejection fractions (32±10% versus 56±11%, respectively; p<0.001) and better clinical statuses (NYHA Class III and IV: 83.9% versus 74.4%, respectively; p=0.001). Device implantation was successful in 98.3% of patients, with MR graded ≤2 at discharge in 93.8% of patients. The mean procedural time was 1 hour and 10 minutes and the mean number of MitraClips implanted per patient was 1.75±0.7 (1 clip [35.6%], 2 clips [52.0%], 3 clips [10.7%], or 4 clips [0.9%]) (Figure 1).

Periprocedural complications occurred in 37 patients (3.6%): 7 cases of cardiac tamponade, 1 transient ischaemic attack, 6 minor bleedings (5 due to haematoma at vascular access site), 8 partial clip detachments (3 requiring conversion to mitral valve surgery), 4 major bleedings, 1 case of major arrhythmia (ventricular fibrillation), and 1 myocardial infarction. The median duration of hospitalisation was

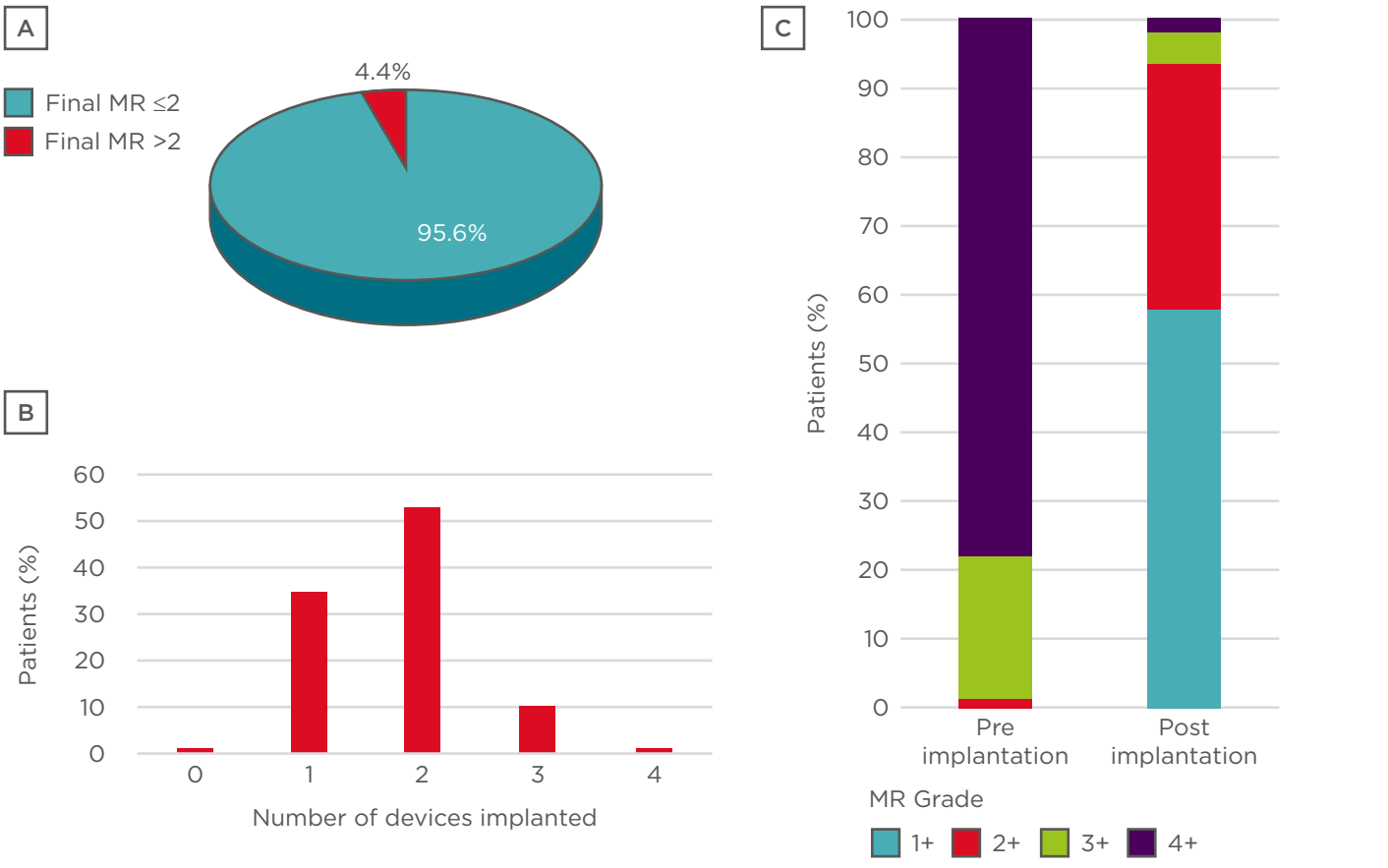

Figure 1: A) MitraClip® insertion procedural success: the number of patients who were discharged with a final mitral regurgitation graded ≤2; B) The number of MitraClip devices implanted in enrolled patients; C) Grading of mitral regurgitation pre and post device implantation.

MR: mitral regurgitation.

5 days (interquartile range: 3–7), with a median time of stay in the intensive care unit of 24 hours (interquartile range: 0.00–45.25). Most of the patients were discharged to their homes (83.9%), whereas 9.8% were sent to rehabilitation facilities, 2.4% to other wards, and 0.8% to non-cardiologic intensive care units.

The in-hospital mortality rate was 3.1% (32 deaths): 5 deaths were related to procedural complications, 25 were caused by multiorgan failure or cardiogenic shock despite procedural success, and procedural failures occurred in 2 cases. The main aetiology of the 25 patients who died in hospital despite procedural success was FMR (n=18, 72%), with a mean age of 77 years. A total of 23 of the 25 patients were NYHA Class III and IV; the mean ejection fraction was similar to survivors (39% versus 38%, respectively) but the mean systolic pulmonary artery pressure in the patients who died was higher (55 mmHg versus 46 mmHg, respectively). These acute results show the safety of the MitraClip procedure (3.1% 30-day mortality) with a high success rate (93.8% MR ≤2). Basic demographic and follow-up data will help to clarify the real impact of MitraClip in the management of MR and heart failure.

Transcatheter Aortic Valve Implantation in Extremely Low Coronary Arteries

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Keywords: Complications, coronary occlusion, transcatheter aortic valve implantation (TAVI).

Citation: EMJ Int Cardiol. 2018;6[1]:53-54. Abstract Review No. AR8.

CLINICAL CASE

An 82-year-old female patient with a history of chronic heart failure New York Heart Association (NYHA) Class II–III due to aortic stenosis was evaluated by progression of their symptoms. An echocardiogram (ECG) confirmed a severe degenerative aortic stenosis with normal left ventricle ejection fraction. The case was discussed by the heart team, and, considering the patient's age and fragile condition, transcatheter aortic valve implantation (TAVI) was the first option; the patient had a Society of Thoracic Surgeons (STS) risk score of 2.11%. Coronary angiogram showed no significant coronary stenosis and preprocedural computed tomography (CT) revealed an aortic annulus with a mean diameter of 22.3 mm, sinus of valsalva diameter of around 25 mm, a left coronary artery ostium with a height of 4.6 mm, and a right coronary ostium of 9.3 mm. Due to the extremely low height of the coronary arteries and the subsequent high risk of coronary occlusion, the patient was offered a surgical replacement that was rejected. The authors then planned transfemoral-TAVI under general anaesthesia, selecting a valve that would allow them to reposition, recapture, and, eventually, easily access the ostia of the coronary arteries if necessary. The valve used was a Portico No. 23 mm (Abbott Laboratories, Abbott Park, Illinois, USA) self-expanding and repositionable valve. Firstly, the left main coronary artery (LMCA) was protected using a 3.5 JL guiding catheter, a guide wire, and a stent; this was to be used as a rescue technique in case of LMCA occlusion, which seemed to be the most likely adverse event. Secondly, the authors performed an aortic valvuloplasty with an 18 mm Cordis balloon (Cordis, A Cardinal Health Company, Milpitas, California, USA), during which they injected contrast that confirmed flow to both coronaries.

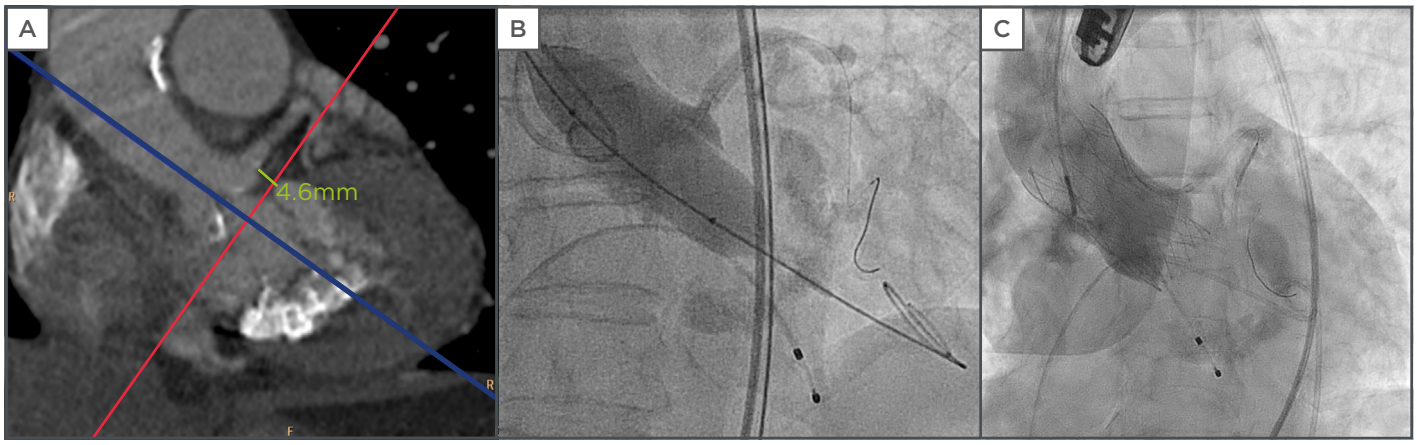

Figure 1: A) Multidetector computed tomography (CT) scan showing the LMCA height of 4.6 mm; B) certifying normal flow through the coronary arteries during balloon inflation; C) controlled valve release and LMCA protection system.

LMCA: left main coronary artery.

Finally, while maintaining the guiding catheter to protect the LMCA, the authors began a controlled release of the valve until complete expansion without incident, certifying normal flow through both coronary arteries with the absence of aortic regurgitation at the end of the procedure. They then easily removed the left main protection system (Figure 1).

DISCUSSION

TAVI is a feasible technique in patients with severe aortic stenosis and low coronary artery height, but there are several safety measures that should be considered: root angiography at the time of balloon valvuloplasty, the use of repositionable and recapturable valves, careful positioning of the transcatheter valve, and placement of a guidewire (with or without a stent) in the coronary ostium at the time of valve deployment.[1-3]

References

1. Ribeiro HB et al. Coronary obstruction following transcatheter aortic valve implantation: A systematic review. JACC Cardiovasc Interv. 2013;6(5):452-61.
2. Ribeiro HB et al. Predictive factors, management, and clinical outcomes of coronary obstruction following transcatheter aortic valve implantation: Insights from a large multicenter registry. J Am Coll Cardiol. 2013;62(17):1552-62.
3. Ribeiro HB et al. Incidence, predictors, and clinical outcomes of coronary obstruction following transcatheter aortic valve replacement for degenerative bioprosthetic surgical valves: Insights from the VIVID registry. Eur Heart J. 2018;39(8):687-95.

Percutaneous Coronary Intervention Guided by Fractional Flow Reserve: Long-Term Outcomes

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Keywords: Fractional flow reserve (FFR), percutaneous coronary intervention (PCI), stable angina, stent.

Citation: EMJ Int Cardiol. 2018;6[1]:54-56. Abstract Review No. AR9.

The role of percutaneous coronary intervention (PCI) for the treatment of patients presenting with acute coronary syndromes has been firmly established, as it confers a survival benefit.[1,2] Nonetheless, a substantial number of PCI worldwide are not performed in an acute setting; instead the technique is used for patients with stable coronary artery disease. According to data from the CathPCI Registry,[3] 29.6% of PCI performed in the USA were for patients with stable angina, atypical symptoms, or those that had no symptoms. The efficacy of the procedure in the nonacute context has been addressed by a number of randomised controlled trials, registries and meta-analyses, with conflicting results.[4,5] A key point for the interpretation of these results is that the decision to perform PCI was based on visual (anatomical) assessment of the lesions, thus not taking into account their physiological impact.

The Fractional Flow Reserve versus Angiography for Multivessel Evaluation 2 (FAME 2) trial sought to address this issue and compared the outcomes of PCI plus medical therapy to medical therapy alone in patients with stable coronary artery disease that had functionally significant stenoses. All lesions that were angiographically significant were assessed by fractional flow reserve (FFR). Only patients that had at least one lesion with an FFR value ≤0.80 were subsequently randomised to receive either PCI with second-generation drug-eluting stents (DES) plus medical therapy or medical therapy alone. The primary endpoint was a composite of death, myocardial infarction, or unplanned hospitalisation that led to urgent revascularisation. Patients were followed-up for 5 years and had their angina status assessed at each time point.

Enrolment was stopped prematurely, due to a significant difference in the primary endpoint in favour of the PCI group. Of the 1,220 enrolled patients, 888 had at least one functionally significant stenosis (FFR≤0.80) and were randomised to either the PCI plus medical therapy group (n=447) or the medical therapy alone group (n=441). The outcomes at 1, 2, and 3 years have been previously reported, and point to a beneficial effect of PCI for the primary endpoint (driven by a significant reduction of urgent revascularisations), a numerically lower rate of death or myocardial infarction and significant reduction in angina with comparable cost to medical therapy alone.[6-8]

The final 5-year results of the trial, which were recently published, confirm and lend further support to the long-term efficacy of an FFR-guided PCI strategy for patients with stable coronary artery disease.[9] Patients treated with PCI had a significantly lower event rate for the primary endpoint as compared to patients treated with medical therapy alone (13.9% versus 27.0%; hazard ratio: 0.46; 95% confidence interval: 0.34–0.63) and their event rate was comparable to patients that did not have any functionally significant lesion (13.9% versus 15.7%; hazard ratio: 0.88; 95% confidence interval: 0.55–1.39). While urgent revascularisation remained the main driver of the lower event rate in the PCI group, a strong signal towards a lower rate of myocardial infarctions emerged (8.1% versus 12.0%; hazard ratio: 0.66; 95% confidence interval: 0.43–1.00). More than half (51%) of the patients randomised to receive medical therapy alone eventually crossed over to the PCI group and this may explain why relief from angina was comparable between the two groups at 5 years.

In summary, the 5-year results of the FAME 2 trial confirm the role of FFR for selecting patients that will benefit from PCI. Only patients with functionally significant lesions derive long-term benefits after stenting regarding relief from angina and urgent revascularisation. Importantly, and despite the high cross-over rate

that may have diluted the results, there is now evidence that an FFR-guided PCI strategy has a beneficial effect on a hard outcome such as myocardial infarction.

References

1. Ibanez B et al.; ESC Scientific Document Group. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). Eur Heart J. 2018;39(2):119-77.
2. Roffi M et al.; ESC Scientific Document Group. 2015 ESC guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation: Task force for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation of the European Society of Cardiology (ESC). Eur Heart J. 2016;37(3):267-315.
3. Dehmer GJ et al. A contemporary view of diagnostic cardiac catheterization and percutaneous coronary intervention in the United States: A report from the CathPCI Registry of the National Cardiovascular Data Registry, 2010 through June 2011. J Am Coll Cardiol. 2012;60(20):2017-31.
4. Boden WE et al. Optimal medical therapy with or without PCI for stable coronary disease. N Engl J Med. 2007;356(15):1503-16.
5. Windecker S et al. Revascularisation versus medical treatment in patients with stable coronary artery disease: Network meta-analysis. BMJ. 2014;348:g3859.
6. De Bruyne B et al.; FAME 2 Trial Investigators. Fractional flow reserve-guided PCI versus medical therapy in stable coronary disease. N Engl J Med. 2012;367(11):991-1001.
7. De Bruyne B et al.; FAME 2 Trial Investigators. Fractional flow reserve-guided PCI for stable coronary artery disease. N Engl J Med. 2014;371(13):1208-17.
8. Fearon WF et al.; FAME 2 Trial Investigators. Clinical outcomes and cost-effectiveness of fractional flow reserve-guided percutaneous coronary intervention in patients with stable coronary artery disease: Three-year follow-up of the FAME 2 Trial (Fractional Flow Reserve Versus Angiography for Multivessel Evaluation). Circulation. 2018;137(5):480-7.
9. Xaplanteris P et al. Five-year outcomes with PCI guided by fractional flow reserve. N Engl J Med. 2018. [Epub ahead of print].

Dedicated Bifurcation Cobalt-Chromium Sirolimus-Eluting Stent in the Treatment of Distal Left Main Stenosis: Optical Coherence Tomography Evaluation of the Stent Healing Pattern

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Keywords: BiOSS LIM C stent, distal left main, optical coherence tomography (OCT).

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BACKGROUND

The optimal form of treatment for left main (LM) coronary artery disease, a form of atherosclerosis, is still debated. The aim of this study was to assess the effectiveness and safety profile of the distal LM stenosis treatment with the new cobalt-chromium sirolimus-eluting BiOSS LIM® C stent (Bifurcation Optimization Stent System, Warsaw, Poland).[1-3]

METHODS

BiOSS LIM C is a coronary-dedicated bifurcation sirolimus-eluting balloon expandable stent made of cobalt-chromium (strut thickness: 70 µm). It is coated with a biodegradable polymer comprised of lactic and glycolic

acids. The polymer releases sirolimus in a time-controlled manner lasting around 8 weeks. The stent consists of two parts with different diameters connected with two struts 1.7 mm in length. BiOSS LIM C is mounted on a dedicated bifurcation balloon, Bottle® (Balton, Warsaw, Poland). The stent delivery is a rapid exchange system.[4-7] Between September 2016 and December 2017, patients from two Polish centres with a final diagnosis of stable coronary artery disease or acute coronary syndrome without ST-segment elevation who had signed informed consent documents were enrolled. Patients with ST-elevation myocardial infarction (MI) or Medina type 001 bifurcation lesions were excluded from the registry. Provisional T-stenting was the obligatory strategy. Double antiplatelet therapy is planned for 6–12 months. An angiographic control with intravascular ultrasound or optical coherence tomography (OCT) is planned at 12 months. The primary endpoint is the rate of cardiac death, MI, and target lesion revascularisation at 12 months. The authors have presented the interim results here.

RESULTS

The study so far included 53 patients with stable coronary artery disease or non-ST-elevation acute coronary syndrome (67.9% versus 32.1%, respectively). The mean age of enrolled patients (77.4% males) was 66.26±8.57 years. There were 47 (88.7%) patients with hypertension, 23 (43.4%) with diabetes, and 30 (56.6%) with prior MI. Additionally, 28 patients (52.8%) underwent prior percutaneous coronary intervention, while 11 (20.8%) patients had previous coronary artery bypass graft. The mean SYNTAX score was 22.52±7.58 and EuroScore II was 1.62%±1.70%. True bifurcations were treated in 70.1% of cases. According to the Medina classification, true bifurcations were present in 70.0% of cases. All BiOSS stents were implanted successfully (average pressure: 15 atm). The mean nominal stent parameters were as follows: 4.17±0.36 mm x 3.42±0.35 mm x 19.94±3.16 mm. In 15 (28.3%) cases, the second stent was implanted within the side branch with the use of the T and protrusion technique. The proximal optimisation technique was performed in 37 cases (69.8%), and in 92.5% this required radial access. In 3 cases (5.7%) periprocedural MI was diagnosed. At 1 (n=51) and 3 (n=47) months, all patients had not experienced any cardiac event (out-of-hospital major adverse cardiac event rate was 0%). At 12 months (half of the patients were controlled) in OCT analysis neointima burden was comparable between proximal and distal part of the stent and did not exceed 30%.

CONCLUSIONS

New dedicated bifurcation BiOSS LIM C stents seem feasible devices with promising effectiveness and safety in distal LM stenosis. Complete BiOSS LIM C angiographic and OCT data will answer the question as to whether the new stent platform with thin struts that was used is advantageous.

References

1. Gil RJ et al. First-in-man study of dedicated bifurcation cobalt-chromium sirolimus-eluting stent BiOSS LIM C® - Three-month results. Kardiol Pol. 2018;76(2):464-70.
2. Bil J et al. Assessment of vascular response to BiOSS LIM C® stents vs Orsiro® stents in the porcine coronary artery model. Cardiovasc Ther. 2017;35(4).
3. Gil RJ et al. BiOSS LIM C: Thin-strut cobalt-chromium version of the dedicated bifurcation stent. Expert Rev Med Devices. 2017;14(4):279-84.
4. Bil J et al. Self-positioning properties of dedicated bifurcation coronary stent BiOSS LIM® in the eye of 3D optical coherence tomography. Minerva Cardioangiol. 2017;65(2):194-6.
5. Gil RJ et al. Comparison of dedicated BIOSS bifurcation stents with regular drug-eluting stents for coronary artery bifurcated lesions: Pooled analysis from two randomized studies. Cardiol J. 2017. [Epub ahead of print].
6. Gil RJ et al. Regular drug-eluting stents versus dedicated bifurcation drug-eluting BiOSS® stents for coronary bifurcation treatment: Four-year results of randomized POLBOS I and POLBOS II clinical trials. EuroIntervention. 2018. pii: EIJ-D-18-00172. [Epub ahead of print].
7. Gil RJ et al. Comparative assessment of three drug eluting stents with different platforms but with the same biodegradable polymer and the drug based on quantitative coronary angiography and optical coherence tomography at 12-month follow-up. Int J Cardiovasc Imaging. 2018;34(3):353-65.

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Congress Diary

Harry Baldock
Editorial Administrator

You awaken in a hotel bed. It's early, the Parisian sun just creeping above the high-rise buildings. You shower quickly and get dressed. →

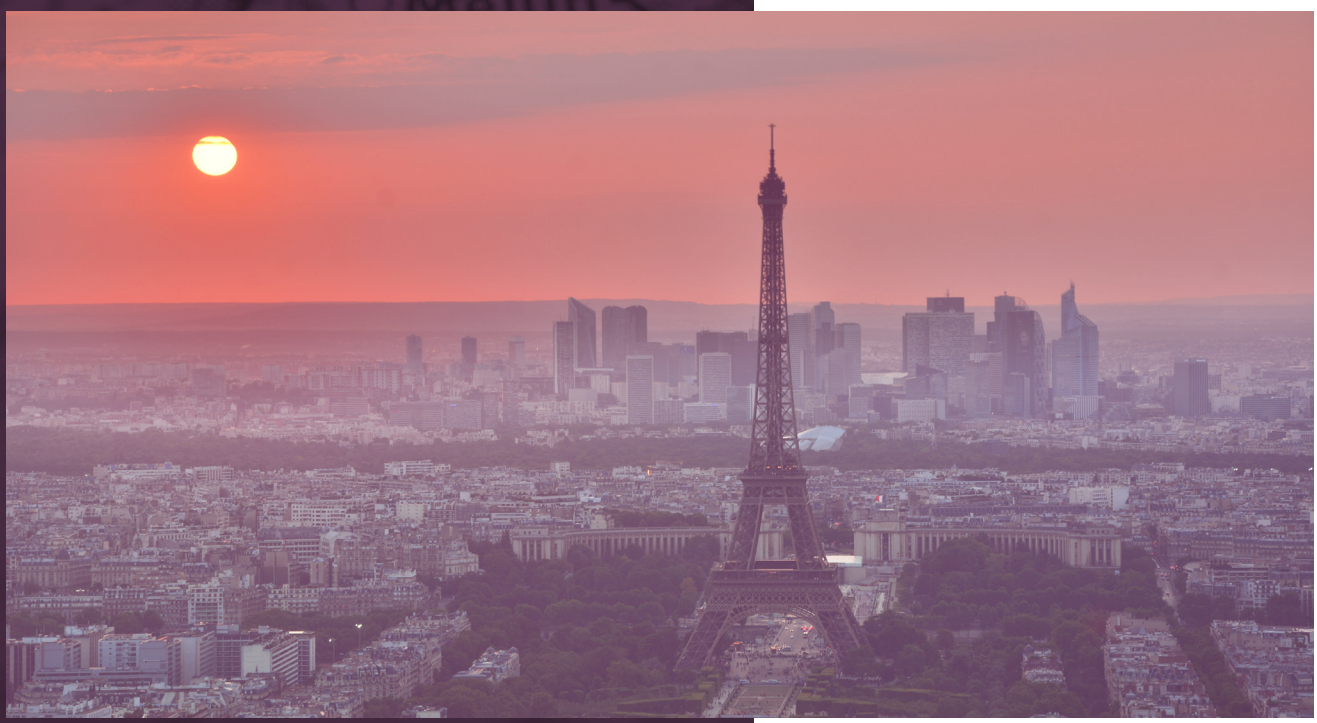
A swift breakfast: a croissant (well, this is France after all) and a cup of coffee. You check your schedule. There's so much to see, but thankfully you're well prepared. The taxi is here. You check your camera and your notepad and you're ready. It's going to be a long day, but you wouldn't miss it for the world.

This is interventional cardiology.

This is progress.

This is EuroPCR.

This year was my first time attending EuroPCR. Fresh-faced and optimistic, I was part of a delegation sent by the EMJ to absorb every ounce of wisdom and excitement that the congress had to offer, in order to relay it to you in the *EMJ Interventional Cardiology 6.1* Congress Review. What follows is a brief recollection of my first day at the event, complete with useful tips to help you make the most of your visit to EuroPCR next year.



For the EMJ team, the congress starts bright and early. Press conferences take place from 8am and I was one of many sleepy-eyed reporters huddled around a cup of steaming coffee in the press room. We early birds were rewarded, however, with an exciting press release detailing the upcoming themes of the main sessions being presented throughout the day, including an update on the important ORBITA trial and the European Association for Percutaneous Coronary Intervention (EAPCI)'s official statement on PCI treatment for chronic coronary syndrome, presented by EAPCI President Prof Michael Haude.

My first tip relates to how you can keep abreast of this breaking information: social media is invaluable. Reporters will be sharing this information online as soon as the embargos have been lifted, so make sure to follow them on social media to receive the latest updates.

After getting a tantalising taste of what's to come, we headed hungrily to the Opening Ceremony. The Grand Amphithéâtre was quickly filled with interventionalists and EuroPCR 2018 was introduced in earnest by Prof William Wijns and Prof Jean Fajadet, showcasing the innovative new session formats on offer, as well as formally presenting the Ethica Award.

Opening ceremonies offer wonderful insights into novel developments from the event's scientific programme: i.e., what the congress organisers themselves are excited about. These sessions inevitably receive much attention, so make sure you arrive early to secure your seat. Additionally, sessions will already be running in tandem to the Opening Ceremony, so be sure to check your schedule carefully for early specialist sessions.

In the case of EuroPCR, the Opening Ceremony was a brief affair lasting just half an hour; the reason for this quickly became apparent. A live session from Bahrain was being broadcast on the big screen, with the opportunity to ask the practising interventionalists questions directly using the EuroPCR app. This was one of many such events being hosted at EuroPCR and proved to be easily as exciting as any sporting event, complete with gasps and applause from the audience as the interventionalists on show skilfully overcame complications.

This session continued for nearly 2 hours, ending around midday, and here it is worth noting the importance of something none of us can do without: food! With so much on offer around the clock, it is all too easy to forget how hunger hampers the learning process. Many sessions provide a complimentary lunch, as indicated on the schedule itself, so be sure to take full advantage of this offer.

Leaving the Grand Amphithéâtre, we were plunged directly into the bustling exhibitors floor, where companies of all shapes and sizes vied for the attention of the swirling delegates. As always, planning is imperative here, and floor plans are readily available online to guide you to your chosen companies.

Making our way through the milieu, we headed directly to the first of many unique opportunities on offer at EuroPCR, appropriately titled 'Interactive Case Corner'. In contrast to the rooms designated for most of the sessions, this area was an open-plan presentation space

set outside the Training Village, allowing delegates to wander by at their leisure. Unique cases were presented almost non-stop throughout the day amidst the hubbub of the congress atmosphere, allowing any passer-by to have their say.

Next up was another unique offering from the EuroPCR programme. 'An Image is Worth a Thousand Words' sessions allowed presenters to share their most puzzling images from clinical cases. I sat in awe as the room of interventionalists came together to collectively diagnose the condition and propose solutions, bouncing ideas off one another. This was certainly a learning experience and a highlight of EuroPCR for all involved.

Interactivity is a cornerstone of the learning process, a fact that is not forgotten by congress organisers. With so many lectures and presentations on show, be sure to set aside some time to attend more informal sessions like these, which afford a more direct interaction with the speakers and the subject matter.

Around mid-afternoon, I took the opportunity to talk with one of *EMJ Interventional Cardiology's* venerable Editorial Board members, Dr Pablo Sepúlveda, and the transcript of our conversation can be found later in this journal. As Dr Sepúlveda pointed out, the wonderful research on show at congresses like EuroPCR is only part of the experience; it is the chance to network with peers from around the world that really brings the event to life.

When planning, it is integral to set aside some time for discussion with peers. Unique opportunities for collaboration are all around you. Experienced congress attendees will not only be able to provide you with great medical insight but can also help you refine your congress schedule. Be sure to find out what sessions the leaders of the field are interested in and why.

Finally, there was one last session of the day that I did not want to miss, amusingly called 'PCR's Got Talent'. I had not yet had the opportunity to take advantage of the vast array of excellent posters and abstracts provided at EuroPCR, most of which could be accessed by the touchscreen devices in the designated poster area, so this session was a great way to catch some research, fast! Attendees shared their research in rapid, 3-minute-long presentations, after which the audience and judging panel voted on which presentations should proceed to the next round.

While the late-breaking trials naturally take precedence in the congress schedule (and rightly so), the wealth of research available in the form of posters and abstracts is staggering. Sessions like PCR's Got Talent, which shower attendees with a broad spectrum of topics, provide an excellent overview of the academic zeitgeist, as well as the areas on which up-and-coming researchers are focussing. If you would like the opportunity to present your prize-winning research to others, take the opportunity and try your luck in the various congress competitions.

The busy day finally drew to a close where it had started: back in the press room for another gripping press conference outlining the late-breaking trials to be revealed the following day. It had been a whirlwind of a day, but one thing was for certain: there would be plenty more to come.

VIEW CONGRESS REVIEW ←

Harry Baldock @EMJHarryBaldock

Editorial Administrator

The sheer scale of an international congress can sometimes make it seem like an impregnable fortress, but this is simply not the case. Here are my top five tips for unlocking the maximum congress experience:

01. ***Have a plan.***

The congress's academic programme is typically released around a month in advance, giving you plenty of time to decide which sessions you want to see. Specified pathways may or may not be constructed for you, but regardless, selecting a theme for your visit will help to keep your experience coherent and comprehensive.

02. ***Be flexible.***

The schedules of large international congresses are inevitably fluid. Although rare, sessions may be cancelled or rescheduled, so keep an eye on the latest programme, which is often available directly from your mobile phone. Do not plan to attend back-to-back sessions all day, as this will see you stressfully rushing from one room to the next without any chance to catch your breath. The congress centres can be large!

03. ***Make time for networking.***

EuroPCR offers an unparalleled opportunity to interact with colleagues from all over the world. In many cases, you will only have the chance to meet with these people face-to-face once a year at this very event, so make sure you seize this unique opportunity.

04. ***Use the technology.***

We live in a digital age and making good use of integrated technology can hugely augment one's congress experience. The EuroPCR App is a great way to manage your schedule and keep abreast of the latest goings on. Likewise, social media platforms like Twitter provide an amazing source of real-time interaction with colleagues on congress topics (follow @EMJIntervention and use #EuroPCR). It's a great way to discuss the highlights of parallel sessions that you couldn't attend yourself, so don't miss out.

05. ***Don't worry.***

It is impossible to see everything at a congress of this scale, but have no fear, the EMJ team are always on hand to provide a comprehensive review in the upcoming issue of *EMJ Interventional Cardiology,* published just 6 weeks after the congress. I truly hope you enjoy it.

Congress Interview

Dr Pablo Sepúlveda Varela

Hospital San Juan de Dios, Chile

During the EuroPCR 2018 Congress, we sat down with *EMJ Interventional Cardiology* Editorial Board member Dr Pablo Sepúlveda Varela to learn more about his thoughts and opinions of the congress so far. The importance of congress attendance and the most recent trial results presented at the event were discussed, as well as the impact of these outcomes on clinical practice in Dr Sepúlveda Varela's home country of Chile.

Do you and your colleagues in Chile come to Europe often for congresses like this one?

Multiple times a year. Two-to-three times a year we come to the big events, like the European Society of Cardiology (ESC) Congress and EuroPCR, depending on where they are. Actually, from Chile right now, there are around 20 interventional cardiologists attending this congress, including fellows; it is a big delegation. There are not too many interventional cardiologists in Chile (around 65 actively practising), so having 20 leave the country at once is a big deal!

I also try to go to the Transcatheter Cardiovascular Therapeutics (TCT) congress in the USA, but I think the European conferences are much more comprehensive and can be better organised, although both European and American conferences are of high quality. Chile tends to follow the European guidelines a bit more, depending on the pathology you are looking at, although sometimes it is better to be more conservative, like in the USA. I think the European guidelines tend to change at a faster pace. Sometimes the scientific evidence is advancing really fast and you see the European societies grab that information; sometimes that is good, sometimes it is not. As an interventionalist, I am not conservative at all; you want to push things and I think this is more in-line with European guidelines. I cannot speak for all interventionalists in my country, but for me and my centre, we tend to look more towards Europe than to the USA. I also trained in Belgium, so perhaps that is why I am keen to visit the European events!

"That is something the interventional community shares all over the world: they like to share their complications openly, so that they can be criticised, and I think you learn from that criticism."

Information from the SPYRAL and RADIANCE trials have just been released. What is your opinion on renal denervation for treating hypertension and do you think this will affect your current practice?

We adopted [renal denervation] very early, but then we got the data from the SYMPLICITY HTN-3 trial. Around that time, I was working in a centre in Santiago, Chile that was one of the first to adopt renal denervation, but when we saw the results of the first randomised trial with the sham procedure as control, we decided to stop the programme. Now, when you look at the data from RADIANCE and SPYRAL presented here at EuroPCR, it is really amazing and really encouraging, but I think we still have to wait a little bit due to the small number of patients treated and short follow-up with both devices. For the time being, our centre will not be getting involved, but we will see what happens. Let's see where this second and third wave of research takes us. At least in my country, where there are cost issues involved, we have to wait; this is not the same for procedures like transcatheter aortic valve implantation or mitral valve treatment, where every day the treatment is growing more successful.

Are there any presentations that you have seen so far that you think will be of particular impact to your practice back home?

We tend to follow certain pathways when we come to this kind of congress. Of course, we have to report to our country when we come back and talk to our colleagues about the presentations we saw, but this tends to be about the hot topics, like the late-breaking clinical trials. But we do follow certain pathways in doing so. I am here with my fellows, so right now I am here in support of their presentation and clinical cases.

I also like to see the complications. There is a subset of presentations here, from all over the world, dealing with complications. When you see how they deal with problems and integrate innovation, you learn a lot. That is something the interventional community shares all over the world: they like to share their complications openly, so that they can be criticised, and I think you learn from that criticism.

"It is amazing that these huge venues have been replicating these live sessions from other countries. Even if you work in a small country like Chile, you can still participate in this sort of session."

For me personally, I am following all the sessions and trials related to the tricuspid valve, the forgotten valve. Not many people really care about the tricuspid valve and I see that there is a future in that area not just for surgery but also for the interventionalist. We are getting some new devices that are being tested, and I will be interested to see if, in 2–3 years, it may be possible to implement these in my country. I do a lot of right heart catheterisation and I am involved with pulmonary hypertension, so I see patients with tricuspid regurgitation. I see a lot of growing interest every year in this area of pathology, so this is something I will be following at this year's EuroPCR.

A live session, broadcast from Bahrain, was on show immediately after the Opening Ceremony. What did you make of this broadcast?

Ah yes! I was there. It was excellent. Really interesting.

The congress involves professionals from many countries all over the world. Is this type of surgical broadcast common in the interventional community or is it reserved for major meetings like this?

These sessions are amazing. It is amazing that these huge venues have been replicating these live sessions from other countries. Even if you work in a small country like Chile, you can still participate in this sort of session. It is also interesting that, when I came to this meeting around 10–15 years ago, when I was a fellow, I remember seeing this complex live case and learning a lot, but now, while there are still complex cases, it no longer feels new to me! As you grow in your profession, you continue to learn every day and when you see these

cases you say: "Okay, I would do more or less what the interventionalist is doing now," or "Maybe I would change this or that." It is amazing how when you see a live case (not a prepared or pre-recorded case), they face the same complications all over the world, with the same materials, the same catheters, etc. Cost may represent a barrier for certain elements, but technique, the way they select the patient, and the complaints that the patients refer to are all universal. It is amazing that in Bahrain, France, and London, they all approach the patient in mostly the same way. This is very reassuring when you come from a less developed country with more limitations and less access to this kind of first-world medicine.

When you come to events like EuroPCR, do you plan in advance what sessions you will attend?

Yes, you have to plan before you come here. The final programme is available maybe a month before, and then you have the congress app, so you can input the sessions into your schedule. As I told you, I try to follow a pathway. You cannot go to every session, so you must say to yourself: "Okay, this year I am going to go to the structural cases, I am going to see mitral valve sessions, aortic valve sessions. This year I am looking for tricuspid valve sessions, next year I will look for complex coronary interventions, etc." Sometimes, these sessions are already organised as a discrete pathway, but if you do not have that premade pathway available then you try to select your own. For me, it is a mixture of live cases, learning sessions that I attend with my fellows, and two or three topics where you try to grab the latest breakthroughs.

EuroPCR represents a huge opportunity for networking. What do you get up to with your fellows and international colleagues while at the event?

This is key. Nowadays, it is not like it was 20 years ago. You do not need to go to the congress to get the information, everything is online: the live sessions, summaries of the congress; you can pay to have a session made available to you. But what you need to come to the congress for, of course, is to interact with colleagues from all over the world and to network. Look at what we are doing right now! We could have this chat online, but it is not the same. You interact, you get involved with colleagues from other groups, you start planning trials, you get in touch with other investigators to get involved in their trials, and you show what you have to offer: your centre, your university, your patients. And of course, there is time to go out also with your colleagues, have dinner, have a chat. It is amazing that sometimes you need to get out of your country, out of your city, out of your workplace, in order to see your colleagues in a social fashion!

"...what you need to come to the congress for, of course, is to interact with colleagues from all over the world and to network. Look at what we are doing right now!"

OUR EXCLUSIVE INTERVIEWS ARE ALSO ON PAGE 24, CLICK HERE TO VIEW ←

Congress Awards

EuroPCR Awards 2018

This year's spectacular EuroPCR Congress saw many reasons to celebrate, including both pioneering research from the field and personal achievements. As always, the organising committee took great pleasure in congratulating the individuals involved in these successes by way of prestigious awards and grants; these included presentation of the renowned Ethica Award, the Best Clinical Case Award, and the EAPCI Awards, as well as declaration of the winner of this year's PCR's Got Talent competition for the Best Abstract Award.

Ethica Award

The Opening Ceremony of EuroPCR 2018 saw two pioneering European practitioners recognised for their outstanding work in transforming cardiac care. The first recipient of the Ethica Award, Dr François Bourlon from Monaco, who is known for his care of African children with congenital heart disease, played a vital role in the recent establishment of a cathlab in Mauritania. Prior to this, he created the Sustain Health development in Africa through Responsible Education (SHARE) initiative in 2008, which provides essential training for African cathlab staff. The Ethica Award was also given to Dr Philip Urban from Switzerland, who has worked with local cardiologists to launch a cathlab in Nepal, a country that has not had this technology before.

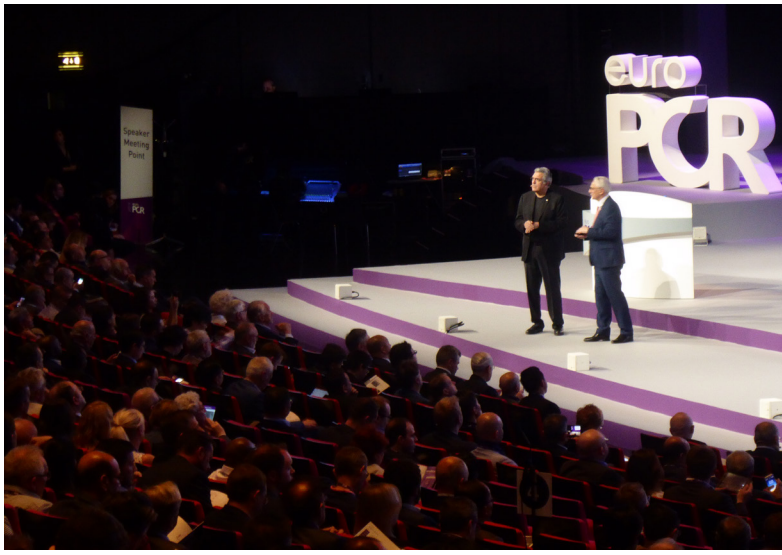
These distinguished professionals were bestowed with the Ethica Award for their work in establishing cathlabs in less developed countries, recognising the substantial contributions they have made to interventional patient care; further cathlabs are also expected to be introduced to Mali and Madagascar shortly, following their efforts. The awardees described how their experiences have helped them to appreciate how fortunate patients from Western Europe are in terms of cardiovascular care; it is therefore hoped that the work of these pioneering clinicians will inspire fellow interventional cardiologists to support less developed countries in building labs and training programmes to enhance cardiological care for all.

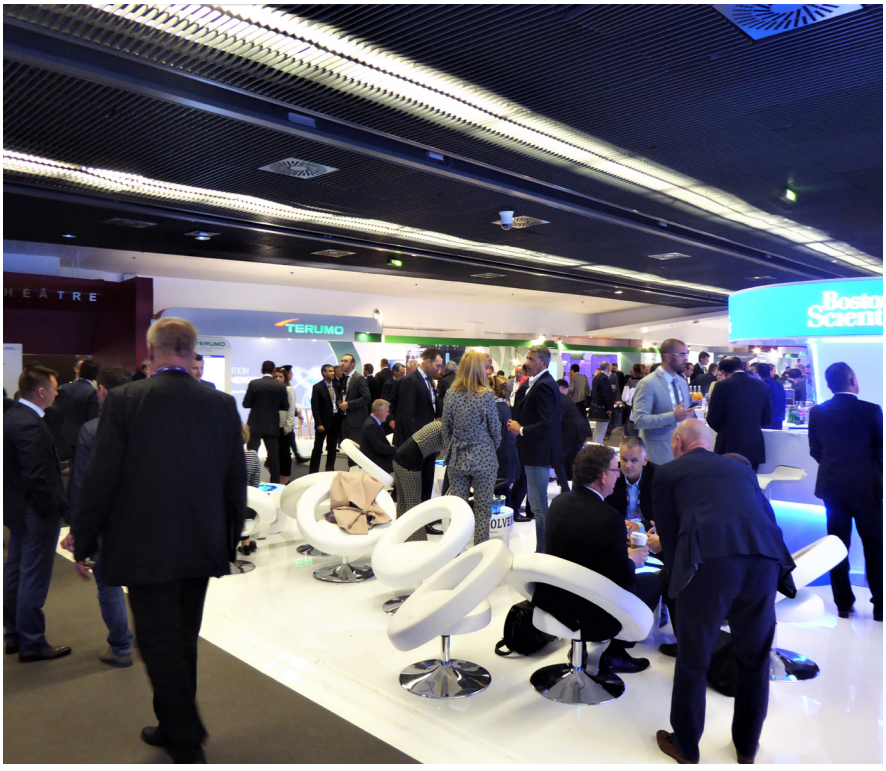
"What these gentlemen are trying to achieve has really empowered local teams to continue delivering care in a sustainable way," commented

EuroPCR co-director William Wijns, who presented the award. He added: "The key to success is to identify the right people who will commit to doing that."

Best Clinical Case Award

This year >1,200 clinical case submissions were received and processed from 74 countries, which were all carefully examined by 253 EuroPCR reviewers. Presented by Prof Jean Fajadet, the 2018 Best Clinical Case Award session saw runners up recognised, including Dr Boris Lescot (France), Dr Soledad Ojeda (Spain), Dr Ozan Demir (Italy), Dr Giorgio Quadri (Italy), and Dr Jean Paul Vilchez Tschischke (Spain). The winner was then revealed as Dr Anantharaman Ramasamy from Barts Health NHS Trust, London, UK, for his case of left main stem trifurcation percutaneous coronary intervention (PCI) using a 'ping-pong' technique in acute coronary syndrome. Dr Ramasamy took to the stage to collect his award and was congratulated on his superb presentation before presenting his winning case to the audience.





EAPCI Awards

The European Association of Percutaneous Cardiovascular Interventions (EAPCI) this year offered five fellowships as part of their commitment to maintaining high standards of professional excellence in interventional cardiology.

The EAPCI Fellowship Committee announced the winners of the 2018 Education and Training Grants during the EuroPCR 2018 Congress. These included Dr Kasparas Briedis (Lithuania), Dr Andreas Mitsis (Greece), Dr Alexandru Patrascu (Germany), Dr Roberto Scarsini (Italy), and Dr Mohammady Shahin (Switzerland), who were all awarded with a 1-year specialised education programme in a European Society of Cardiology (ESC) member country other than their country of residence. These fellowships provide the opportunity for professionals in their early careers to contribute to the enhancement of academic standards and encourage communication and exchange of ideas between countries.

In addition to these fellowships, this year the EAPCI offered the opportunity for 10 medical graduates to take part in a 4-week observational programme on a dedicated technique in a centre of excellence. The winners were Dr Kirill Berezhnoi (Russia), Dr Micaela Conte (Belgium), Dr Quentin De Hemptinne (Belgium), Dr Ulyana Dryneuskaya (Republic of Belarus), Dr Mohamed El Ghary (Germany), Dr Hatem El Shahawy (Germany), Dr Tomasz Gasior (Poland), Dr Nina Glavnik (Slovenia), Dr Piotr Kalmucki (Poland), and Dr Bejan Stanetic (Bosnia and Herzegovina).

EuroPCR 2018 Best Abstract Award - PCR's Got Talent

At the beginning of the ceremony it was noted that the number of abstract submissions this year has nearly doubled that received in 2009, showing the improvements in the work and interaction of interventionalists across the world. Prof Alberto Cremonesi commented that 1,087 submissions were received from 58 countries this year and graded by 253 reviewers. For the fourth year running, the PCR's Got Talent competition for the Best Abstract Award took place on-site during the congress, and the three rounds concluded with six finalists all competing for the prize: Dr Krishnaraj Rathod (UK), Dr Kiril Karamfiloff (Bulgaria), Dr Balazs Berta (Netherlands), Dr Sophia Wong (Australia), Dr Janarthanan Sathananthan (Canada), and Dr Yousif Ahmad (UK). Prof Cremonesi was proud to pronounce Dr Yousif Ahmad, Imperial College London, London, UK, the winner of this year's PCR's Got Talent competition for his abstract entitled 'Coronary haemodynamics in patients with severe aortic stenosis and coronary artery disease undergoing TAVI: implications for clinical indices of coronary stenosis severity'. Dr Ahmad proudly accepted his award and presented his prize-winning work to the audience.

VIEW CONGRESS REVIEW ←

History

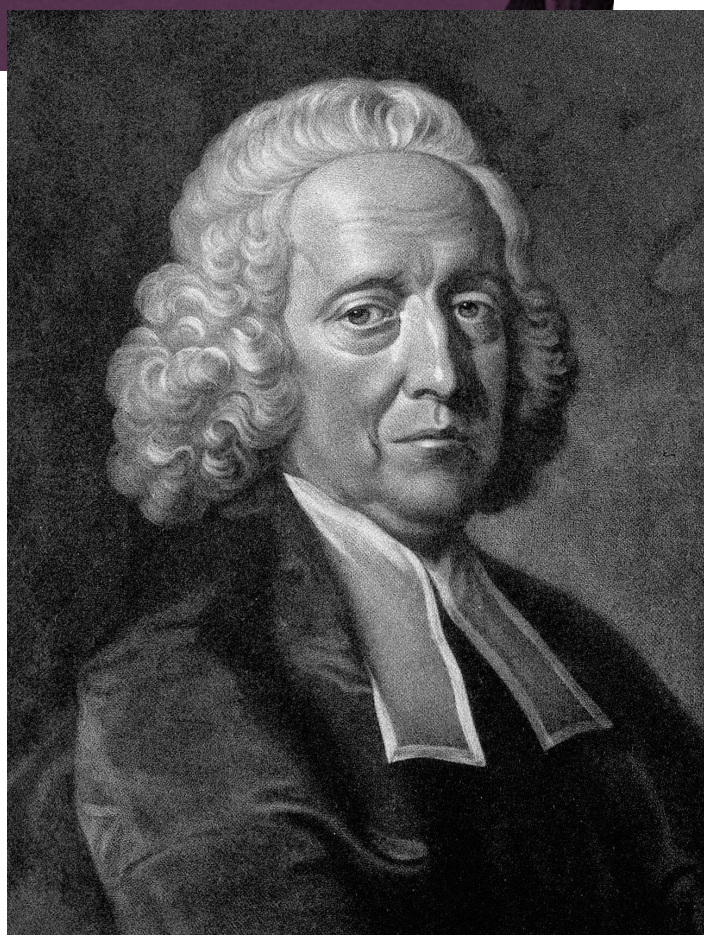
Although interventional cardiology is a relatively new concept, the progress made by the field since its introduction rivals that of other major medical disciplines

Horse Anatomy Head By Wilhelm Ellenberger and Hermann Baum

With great progression being experienced across the world, this ever-changing field is at the forefront of patient care, enhancing survival and treatment of critical cardiology patients via continuous new clinical evidence. However, the field also recognises the importance of understanding and learning from the actions of early pioneers, building on their foundations in order to evaluate new concepts.

History of Interventional Cardiology

The first insight into the usefulness of interventional cardiology techniques was shown by Stephen Hales in 1727, who performed the first cardiac catheterisation in a horse using brass pipes to reach the ventricles. However, the term catheterisation was not coined until 1844, when the first record of intracardiac pressure via a catheter was made by French physiologist Claude Bernard. Around 50 years later, in the mid-1890s, German scientist Wilhelm Röntgen discovered X-rays, a discovery hailed as a medical miracle and one that instigated a revolutionary change to interventional cardiology practice.



Stephen Hales By Mezzotint by J.McArdell after T. Hudson

Throughout the 1900s, many advances were made in this evolving field, including the first human percutaneous transluminal coronary angioplasty procedure by angiologist Andreas Grüntzig in 1977. Building on the work by Charles Dotter, Grüntzig's perseverance was extraordinary, and resulted in the successful treatment of a patient, whose original lesion remained open at 37-year follow-up. He then continued his work by organising the first demonstration course in 1978 and publishing his first results in 1979. As the discipline of interventional cardiology entered the 21st century, dual antiplatelet therapy and primary balloon angioplasty were first performed, and the total number of angioplasties carried out reached 2 million. The extent of progression seen by the field of interventional cardiology in such a short space of time has been phenomenal, expanding across the world, and many more breakthroughs are expected in the near future.

Interventional Cardiology in France

Not only was the programme of this year's EuroPCR congress of significant value to attendees, so too was the host country of France, which is steeped in history from the field of interventional cardiology. The very first EuroPCR congress was held in the city of Toulouse, France, in 1989, and the meeting has since grown rapidly, both in terms of attendee numbers and its impact on the discipline. As the number of attendees increased to around 4,000 in the late 1990s, and now totals >10,000, the congress was moved to the Palais des Congrès de Paris, maintaining the event's close connection to France.

France has been the home of many key figures in the field of interventional cardiology and so is a fitting host for the annual EuroPCR event. Around 70 years after the work of French physiologist Claude Bernard on catheterisation, French national Alexis Carel completed the first canine bypass surgery stenting and transplantation and was awarded the 1912 Nobel Peace Prize for his work. Furthermore, France was the birthplace of the concept of dual antiplatelet therapy for the prevention of stent thrombosis in 1996, following a study of 2,900 patients from 25 French centres. However, one of the most notable figures in this field is French-born interventional cardiologist Alain Cribier, who performed the first balloon valvuloplasty in 1985 and the first mitral commissurotomy in 1995, as well as founding the Indo-French Foundation of Interventional Cardiology. Passionate about pursuing the unmet clinical needs of his patients, Cribier did not stop here; in 2002 he performed the first transcatheter aortic valve implantation (TAVI) procedure in the world. This successful procedure took place in Rouen, France, and has revolutionised the practice of interventional cardiology, as many have since perfected his procedure across the globe and used it to successfully care for many critical patients.

Capitol Place
Toulouse, France

Celebrating Progress

Last year saw the 40th anniversary of Grüntzig's successful angioplasty procedure, and the interventional cardiology discipline took great pleasure in celebrating both the historic and more recent innovations that continue to expand the frontiers of cardiology research. Events such as EuroPCR 2017 were at the forefront of these celebrations, and the 2018 programme built on these advances by presenting the very latest techniques used in the clinic today. This was not the only celebration, as Cribier's achievements in TAVI were also recognised as a great leap forward in interventional cardiology.

Looking to the Future

Now known as the official meeting of the European Association of Percutaneous Cardiovascular Interventions (EAPCI) and the world-leading course in interventional cardiovascular medicine, EuroPCR attracts thousands of participants every year, offering a global forum for sharing knowledge in the interventional community. The latest insights from this year's event showed yet more progression in the field, including advances in the efficacy of percutaneous coronary intervention (PCI), as well as the success of noninvasive diagnostic techniques, which are predicted to surpass their conventional counterparts within the next 5 years.

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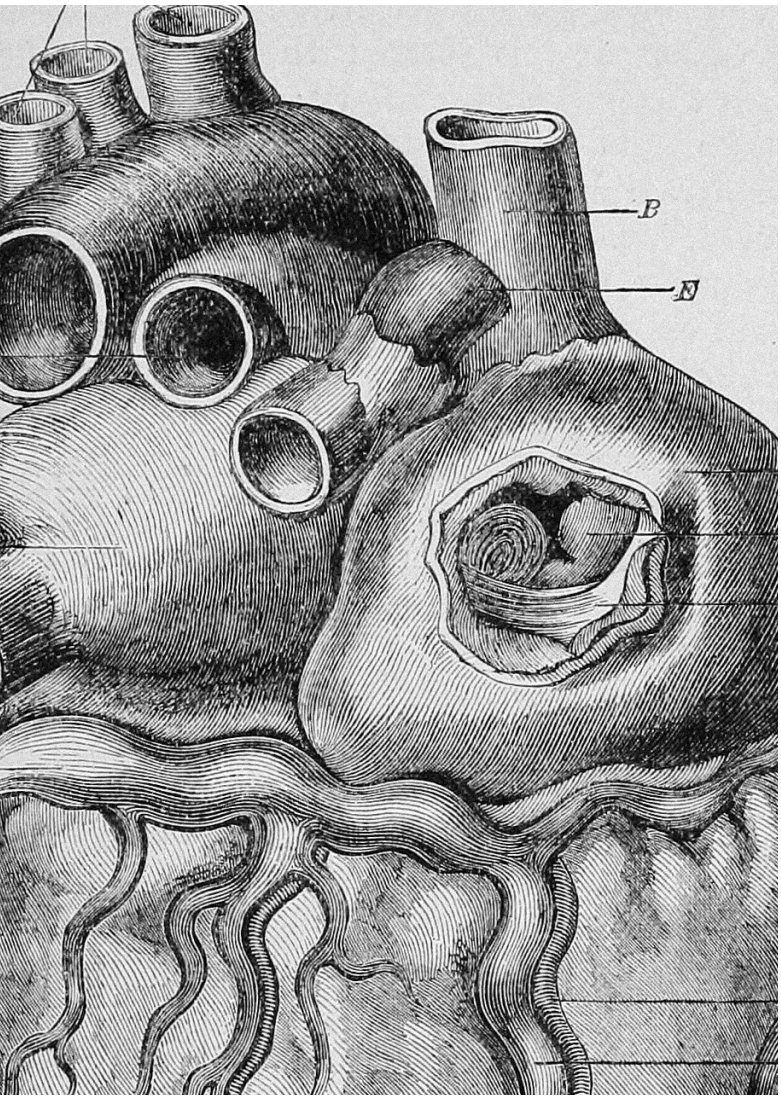

More improvements are also expected for bioresorbable scaffold technology, which has the potential to enhance angioplasty. However, Spencer B. King, the first practitioner to complete coronary angioplasty in the USA, described the most important development in the future of interventional cardiology to be obviating the need for angioplasty altogether. With a focus on improvements in the medical treatment of atherosclerosis, this breakthrough may be possible.

VIEW CONGRESS REVIEW ←

Anatomy of the Arteries of the Human Body
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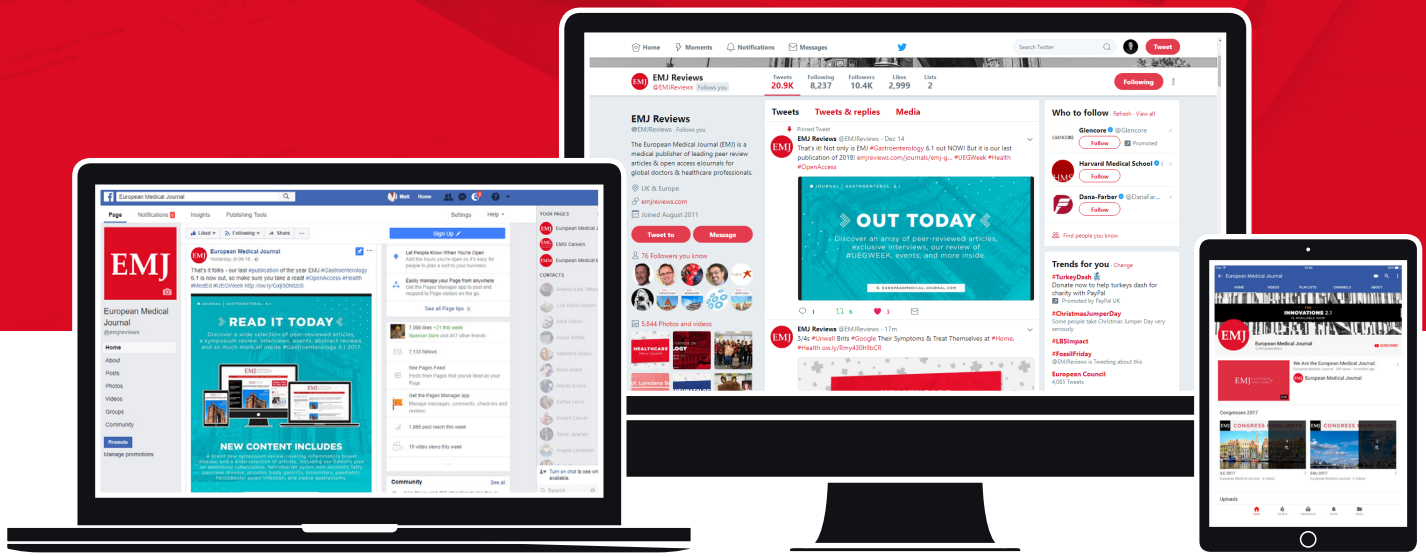

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What's New

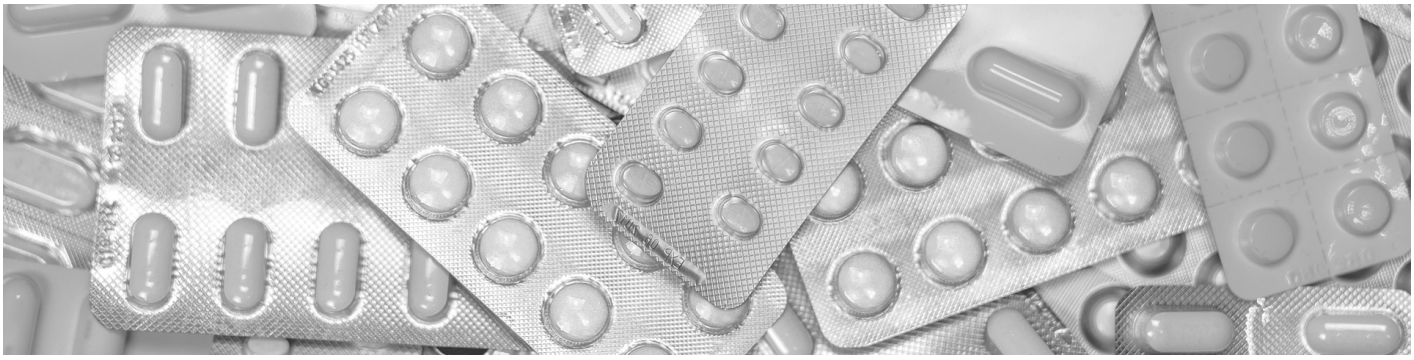
Dementia Prevention in Atrial Fibrillation Patients

ATRIAL FIBRILLATION, other cardiac arrhythmias, and even some of the therapeutics that allow the treatment and management of these disorders have all been linked to an increased risk of cognitive decline and dementia. Now, according to a new consensus report penned by a collaboration of some of the world's largest heart rhythm societies, namely the European Heart Rhythm Association (EHRA), the Heart Rhythm Society (HRS), the Asian Pacific Heart Rhythm Society (APHRS), and the Latin American Heart Rhythm Society (LAHRS), data show there is hope for the delay and even prevention of dementia.

"Patients with atrial fibrillation may be able to reduce their risk of cognitive impairment and dementia by taking their oral anticoagulation medication and living a healthy lifestyle."

The consensus document reported that atrial fibrillation, which is characterised by a resting heart rate considerably higher than the normal 60—100 bpm, is a leading cause of dementia. This connection between arrhythmia and cognitive decline is thought to be because atrial fibrillation is linked to a 2-fold higher risk of silent strokes compared to that seen in healthy patients. The accumulation of these silent strokes over time is thought to be a major contributing factor to cognitive decline. Furthermore, it was reported that treatment with stroke-preventing oral anticoagulants, the front-line treatment for atrial fibrillation, had a beneficial effect on the patients, decreasing the risk of cognitive decline.

Additionally, the societies emphasised the importance of coupling anticoagulation medication with the adoption of a healthy lifestyle, not smoking, and controlling (or ideally preventing) hypertension, obesity, diabetes, and sleep apnoea. Lead author of the study, Dr Nikolaos Dagres, Department of Electrophysiology, Heart Center Leipzig, Leipzig, Germany, stated: "Patients with atrial fibrillation may be able to reduce their risk of cognitive impairment and dementia by taking their oral anticoagulation medication and living a healthy lifestyle." Alongside these findings, the report highlighted the need for further work to improve the early diagnosis and the need to understand the impact of cardiac resynchronisation therapy on cognitive function.



A Safe Alternative to Warfarin: Apixaban

WARFARIN, a vitamin K antagonist, has been a first-line medical therapeutic for around 70 years, but, since its introduction, it has been plagued by side effects, the most common of which being major bleeds, which can be fatal. The results from the highly anticipated AXAFA-AFNET 5 trial outlined the outcomes of tests on the latest contender to take on warfarin for the title of the world's most commonly used anticoagulant: apixaban.

A total of 633 patients from Europe and the USA with atrial fibrillation and signs of stroke were enrolled onto the trial to test the safety of apixaban against vitamin K antagonists, including warfarin. The patients were randomised into two groups, receiving either apixaban or the vitamin K antagonists for at least 30 days prior to a pre-planned catheter ablation procedure. Twenty-two patients receiving apixaban presented with the primary outcome of the trial (a composite of all-cause death, stoke, and major bleeding up to 3 months after the ablation procedure), compared to 23 receiving vitamin K antagonists. Prof Paulus Kirchhof, University of Birmingham, Birmingham, UK, international chief investigator of the trial, stated: "The results show that apixaban is a safe alternative to warfarin during catheter ablation of atrial fibrillation in patients at risk of stroke."

Additionally, both the use of warfarin and apixaban induced small but statistically significant improvements in the cognitive function of patients following atrial fibrillation ablation; this was the first trial to show such cognitive function improvements. Furthermore, the number of patients who presented with bleeding was half what the authors expected, there was a low incidence of stroke (n=2, 0.3%), and 7 cases of cardiac tamponade that were managed with drainage, 2 in apixaban patients and 5 in vitamin K antagonist patients. However, following magnetic resonance imaging (MRI), it was identified that 25% and 27% of vitamin K antagonists and apixaban patients, respectively, showed signs of silent stroke.

Other non-vitamin K oral anticoagulants have also been analysed and performed well in clinical trials. The AXAFA-AFNET 5 trial is the first clinical investigation to compare apixaban with vitamin K antagonists in the context of atrial fibrillation ablation, and showed that apixaban is a safe alternative with a good promise for future use.

"The results show that apixaban is a safe alternative to warfarin during catheter ablation of atrial fibrillation in patients at risk of stroke."

What's New

HeartMate 3: Advancements for Heart Failure Patients

ADVERSE EFFECTS and the need for surgical intervention in patients with advanced heart failure are significantly reduced when using the new HeartMate 3 left ventricular assist device (LVAD). HeartMate 3 is a fully magnetically levitated centrifugal-flow pump that is fully implantable and has wide blood-flow passages that allow shear stress to be reduced. In addition, the device is frictionless, has no mechanical bearings, and is designed to produce an intrinsic pulse that reduces stasis and prevents thrombosis.

The MOMENTUM 3 trial was a multicentre, randomised, prospective, unblinded study that aimed to determine whether the HeartMate 3 LVAD could support those patients who are unable to undergo heart transplantation, or who will be waiting for a long time to undergo the procedure in the future. Results of treatment with this device were compared to those of the HeartMate II LVAD, a mechanical bearing axial continuous-flow blood pump.

A total of 1,028 patients were included in the study, all of whom had New York Heart Association (NYHA) Class IIIB or IV heart failure, from 69 centres across the USA. The patients were randomly assigned to either a HeartMate 3 LVAD or a HeartMate II LVAD. The primary endpoint of the study was for patients to have not received surgical intervention, not experienced a disabling stroke, or required removal of their device due to malfunction, for 2 years.

This primary endpoint was achieved in significantly more patients who had HeartMate 3 than those with HeartMate II (79.5% versus 60.2%, respectively), and the overall survival was higher in these patients (82.8% versus 76.2%, respectively). Significantly more patients with HeartMate 3 did not require surgical intervention compared to those with HeartMate II (98.4% versus 83.0%, respectively). In addition, none of the patients with HeartMate 3 experienced pump thrombosis that required surgical intervention, compared to 12.2% of the HeartMate II patients.

"The overall stroke rate at 2 years is the lowest recorded to date in a LVAD trial."

The number of patients who did not experience a disabling stroke was similar for both LVAD groups (92.8% in HeartMate 3 and 92.5% in HeartMate II), but there were more patients with HeartMate 3 who did not experience any kind of stroke compared to HeartMate II (89.9% versus 80.8%, respectively). These results represent an exciting prospect for heart failure patients, as eluded to by Dr Mandeep R Mehra, Medical Director of Brigham and Women's Hospital Heart and Vascular Center, Boston, Massachusetts, USA, who presented the results of the trial: "The overall stroke rate at 2 years is the lowest recorded to date in a LVAD trial."

Smartwatch Algorithm Detects Atrial Fibrillation

A NEW SMARTWATCH WRISTBAND has been revealed as one of the latest pieces of technology that can aid in the detection of atrial fibrillation (AF) without the need for electrical cardioversions. The KardiaBand wristband (AliveCor, San Francisco, California, USA) has an in-built algorithm that, alongside a physician's review and interpretation, can accurately detect AF and differentiate it from sinus rhythm.

A study to test the automated band took place between March 2017 and June 2017. A total of 100 patients were included in the study, 85% of whom had cardioversion performed. The KardiaBand recordings were compared to an electrophysiologist-interpreted 12-lead electrocardiogram (ECG).

There were 169 simultaneous recordings from the 12-lead ECG and the KardiaBand obtained in the study. Of these, the algorithm deemed 57 recordings as unclassified; these unclassified recordings were due to baseline artefact and low amplitude of the recording (28%), a recording <30 seconds long (21%), heart rate <50 bmp (10%), heart rate >100 bpm (9%), and unclear reasons (32%). In contrast, all recordings from the 12-lead ECG were able to be interpreted. However, when physicians interpreted these unclassified KardiaBand results, AF was correctly diagnosed with 100% sensitivity and 80% specificity. In the 112 recordings where the KardiaBand provided a diagnosis, AF was correctly detected with 93% sensitivity and 84% specificity.

The KardiaBand recordings were compared to the corresponding 12-lead ECG readings, and 22 were uninterpretable, mainly due to baseline artefact. The remaining 147 recordings, when an electrophysiologist assessed the 12-lead ECG and KardiaBand tracings, had 99% sensitivity and 83% specificity. The KardiaBand recordings were then compared to a physician's interpretation, and the band's algorithm was determined to have 93% sensitivity and 97% specificity when detecting AF.

Thus, electrical cardioversions can be avoided without compromising an accurate diagnosis for the patient.

These results mean the KardiaBand can accurately detect AF when combined with a physician's interpretation. Thus, electrical cardioversions can be avoided without compromising an accurate diagnosis for the patient. This is just one of many potential clinical situations in which the KardiaBand can be utilised; other applications can soon be investigated, with the aim of transforming and improving AF patient care.

Events

26TH–28TH JULY 2018

Cardiovascular Innovations 2018

Denver, Colorado, USA

With new innovations constantly trialled, developed, and unveiled, you could be forgiven for finding it difficult to keep track of the most pertinent. Fortunately, Cardiovascular Innovations 2018 is designed to provide key updates on innovative healthcare... Read More

25TH–29TH AUGUST 2018

European Society of Cardiology (ESC) Congress 2018

Munich, Germany

The largest cardiovascular congress on the planet will bring together an estimated 31,000 healthcare professionals from 150 countries over 5 riveting days of scientific sessions. The scale will be breath-taking... Read More

9TH SEPTEMBER 2018

PCR Innovators Day London 2018

London, UK

In such a busy profession, it is difficult to find the time to connect with peers. Although improved communications technology helps with this, networking face-to-face is still an integral aspect of medical development. PCR Innovators Day London is intended... Read More

9TH–11TH SEPTEMBER 2018

PCR London Valves 2018

London, UK

One of the official courses of the European Association of Percutaneous Cardiovascular Interventions (EAPCI), PCR London Valves is one of the largest clinical meetings dedicated to providing the very latest news on transcatheter therapies for valvular heart disease... Read More

Imperial Valve and Cardiovascular Course

London, UK

This year, the Imperial Valve and Cardiovascular Course has been expanded to include a fourth day, enabling more relevant information to be provided for attending cardiologists, cardiac surgeons, vascular surgeons, physiologists, anaesthetists, radiographers... Read More

World Congress of Cardiology and Cardiovascular Health 2018

Dubai, United Arab Emirates

Just because the end of the year is approaching, this does not mean medical progress is taking a break. At the heart of this congress is the World Health Organization (WHO)'s 25 by 25 global target: to reduce premature... Read More

PCR Tokyo Valves 2019

Tokyo, Japan

Targeted at doctors who want to develop their experience of transcatheter aortic valve implantation (TAVI), the aim of PCR Tokyo Valves 2019 is to bring the global standard of TAVI to valve teams in Japan, Asia, and the wider community... Read More

EuroPCR 2019

Paris, France

EuroPCR 2018, reviewed within this eJournal, was a truly memorable event, presenting attendees with thrilling and educational live sessions, simulation-based learning sessions, and, of course, up-to-the minute trial results. Although it seems like a long time... Read More

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