

The EuroIntervention coronary bifurcation treatment supplement

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Bifurcations are frequent in everyday practice and account for approximately 15-20% of all percutaneous coronary interventions (PCI). However, they remain one of the most challenging lesions in interventional cardiology in terms of a lower procedural success rate as well as a higher rate of long-term adverse cardiac events. Despite overwhelming interest in this complex and fast evolving field, the optimal management is still the subject of considerable debate.

The European Bifurcation Club (EBC), initiated in 2004, is an independent, non-political and informal “think tank” of scientists with a particular interest in clinical, technical and fundamental aspects of the management of coronary artery bifurcation lesions. The main objective in founding the EBC was to promote the exchange of ideas on management of bifurcation disease, expressing a profound sense of collaboration in order to improve the quality of care for all. The EBC hosts annual meetings dedicated to various aspects of bifurcation appraisal, which bring together interventional cardiologists, engineers, biologists, physicists, epidemiologists and statisticians for thorough discussions. The “philosophy” of the meetings is that of the sharing of knowledge rather than didactic lecturing by the faculty. Every meeting concludes with a consensus statement, which reflects the unique opportunity of combining the opinion of interventional cardiologists with the

opinion of a large variety of other scientists on bifurcation management¹⁻⁸. The main messages from EBC consensus documents have been incorporated in recent guidelines on myocardial revascularisation on both sides of the Atlantic. Moreover, the vast amount of accumulated scientific, clinical and technical data was integrated in a special supplement of EuroIntervention published in 2010. This previous supplement was very well received by the interventional community and achieved great success with more than 29,000 downloads and more than 111,000 online views, as well as an average citation of 4.7 in the contemporary literature.

Last year, the EBC celebrated its 10-year anniversary, promoting the idea of opening the Club to bifurcation enthusiasts worldwide in order to achieve wider and more effective transmission of information, learning, and new developments. Most of the progress in this field stems from the interaction between basic science and clinical observations generating new hypotheses and research. The consensus of participants, both old and new friends who joined the Club in this venture, was that the amount of basic science and clinical trial data presented in the last five years mandates an update in the form of a special issue of EuroIntervention on bifurcation lesions.

This supplement is designed to reflect the content of the 10-year anniversary EBC meeting, with additional collaboration from other authors on specific subjects which were identified as relevant and

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of interest during the meeting. Selected titles reflect the rapid pace at which this field continues to evolve in view of important technological advances.

The supplement is divided into five parts, beginning with several articles looking at basic knowledge regarding the anatomy and function of coronary trees, the relationship between anatomy, flow and atheroma, followed by descriptions of various definitions and classifications of bifurcation lesions and treatments. Several articles on bench testing modalities, including virtual bench and the Visible Heart programme, provide insights into the behaviour of different stenting techniques in bifurcations and help the interventional cardiologist to choose, deliver and post-dilate appropriately. This section also covers the advantages of dedicated bifurcation quantitative coronary angiography software and available methodologies for the computational estimation of FFR and designates practical considerations of fractional flow reserve (FFR) in the treatment of bifurcation lesions. Presentation of the state of the art in cardiac imaging depicts the role of intravascular imaging studies, intravascular ultrasound and optical coherence tomography, which have provided essential insights into technical aspects of bifurcation stenting and have led to recommendations for optimising the procedure. This section concludes with articles focusing on widely debated issues: the role of side branch predilatation, the mechanism of plaque and carina shifting, and optimisation of the final kissing balloon technique.

The second section focuses on technical aspects of bifurcation stenting. It describes step-by-step contemporary provisional side branch stenting strategy, followed by descriptions of TAP, culotte and crush stenting. Due to the inherent advantages and disadvantages of each two-stent technique, an individualised approach is advised, focusing on the patient's clinical condition, bifurcation morphology and the operator's experience.

The third section is devoted to left main bifurcation treatment, which, though not fundamentally different from other types of bifurcation, is characterised by the presence of a different pattern of atheroma, different angles, larger diameters and a larger volume of myocardium at risk. This section includes a discussion on current indications for percutaneous and surgical revascularisation and provides a glimpse into the EXCEL and the NOBLE trials. Prospective validation of the SYNTAX score II in the EXCEL study population indicated at least equipoise for long-term mortality between coronary artery bypass grafting and PCI in subjects with unprotected left main coronary artery disease up to an intermediate anatomical complexity. This might shift the future focus of the Club towards left main (LM) PCI intervention. Furthermore, specific technical aspects of LM PCI are explained in detail, and the role of dedicated bifurcation systems and bioresorbable vascular scaffolds (BRS) is described.

The fourth section presents the current challenges in the percutaneous treatment of coronary bifurcation lesions and discusses how dedicated bifurcation devices, which are currently still under development, may potentially simplify the procedure and improve clinical outcomes. Several articles describe currently available dedicated

devices and techniques to treat bifurcation lesions. The main limitation remains the fact that most of these bifurcation devices have not yet been compared in a randomised trial with either the provisional or the two-stent strategy using conventional drug-eluting stents, except for the Tryton stent (Tryton Medical, Durham, NC, USA) which is compared with the provisional approach in the Tryton IDE trial.

The fifth section focuses on the emerging role of bioresorbable scaffolds (BRS) in bifurcation lesions. BRS may offer potential advantages compared with metallic DES, aiming at restoring vessel patency without implanting a permanent prosthesis, which may be especially important for bifurcation treatment. However, there are some inherent limitations, which may impact on the widespread use of this technology. The section covers available bench-testing data with different BRS systems and summarises the largest real-world experience and lessons learnt as regards what should and should not be done with respect to treating bifurcation lesions with BRS. The final articles in this section present the consensus reached on bifurcation treatment with scaffolds and an author's glimpse into the future of this exciting technology.

The bifurcation supplement would not be complete without additional online resources. Several articles have supplementary material that you will discover on the EuroIntervention website, with images and moving images that highlight further the performance of each technique. Bifurcation treatment is a fast developing field and we hope that this supplement will become a useful reference for you in the years to come. This supplement would not have been possible without the participation and contributions of the 130 authors and 60 peer review experts. We cannot thank them enough for their commitment and support.

In summary, we hope that this supplement will provide interventional cardiologists with a relevant and timely review of the most important aspects of bifurcation treatment and, at the same time, provide a valuable resource to facilitate and enhance both the treatment strategy and, more importantly, the clinical outcomes of our patients with coronary bifurcation lesions.

Conflict of interest statement

T. Lefevre is a member of the advisory board for Abbott Vascular, Medtronic and Boston Scientific and receives minor fees from Terumo and Biosensors. J.F. Lassen receives scientific grants from Biosensors, St. Jude Medical, Boston Scientific, Terumo, Medtronic, Abbott Vascular and Biotronik. Y. Louvard is a member of the advisory board of Cordis, and receives honoraria from Medtronic, Abbott and Terumo for workshop participation and organisation. D. Hildick-Smith is a member of the advisory board of or received honoraria from Abbott, Terumo, Medtronic, Boston Scientific and Biosensors. The other authors have no conflicts of interest to declare.

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The references can be found in the online version of the paper.

Online data supplement

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