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Foreword

Drug-eluting stents

Imad Sheiban & Fabrizio D'Ascenzo

"...I cannot rest from travel: I will drink life to the lees: all times I have enjoy'd greatly, have suffer'd greatly, both with those that loved me, and alone, on shore, and when Thro' scudding drifts the rainy Hyades Vext the dim sea: I am become a name; for always roaming with a hungry heart much have I seen and known; cities of men and manners, climates, councils, governments, myself not least, but honour'd of them all; And drunk delight of battle with my peers, far on the ringing plains of windy Troy. I am a part of all that I have met; yet all experience is an arch wherethro'gleams that untravell'd world whose margin fades for ever and forever when I move..."

(Ulysses Tennyson, 1883)

Like the novel Ulysses, the interventional cardiologist has realized extraordinary efforts: actually nobody 50 years ago would probably have trusted a physician arguing to treat most of heart diseases with a 'simple' scaffold of metal into the coronary trees. Thanks to enormous parallel effort of physicians and technologies, interventional cardiologists are now being provided some of the most powerful instruments to efficaciously treat their patients.

There were numerous turning points since the introduction of percutaneous transluminal coronary angioplasty (PTCA) as a modality of treatment for obstructive coronary artery disease by Andrea Gruentzig in 1976: the first

demonstration of efficacy was offered applying only balloon angioplasty (plain old balloon angioplasty) in a limited subgroup of patients and coronary lesions, then remarkably expanded to a larger clinical and angiographic spectrum with the innovation of scaffolding the coronary arteries with bare-metal stents (BMSs), which improved safety. However, an important limitation remained unchanged or even worsened – in-stent restenosis.

Consequently, the subsequent innovation was to mix metal and antiproliferative drugs, obtaining drug-eluting stents (DESs), which have rapidly been proven to remarkably reduce in-stent restenosis, realizing the ‘dream’ of interventional cardiologists and soon becoming the gold standard of percutaneous coronary revascularization. However, after its wide application in clinical practice, it was clear that, as with every dream, it was not completely realized. Again, the clinical outcome and the incidence of adverse events is still related to complexity and severity of coronary disease and to number and length of stents/patient used even for DES.

Coronary artery disease currently represents the most important cause of death, mortality and morbidity, and coronary revascularization is the most efficacious treatment to avoid adverse events at short- and long-term follow-up. While coronary artery bypass grafts (CABGs) were unquestionably superior to BMSs, DESs have been proved to be comparable to them in some setting of lesions.

The first-generation, that is, polymer-based sirolimus and paclitaxel stents, thanks to antiproliferative effects of drugs, were demonstrated to be efficacious and safe, although with some issues regarding stent thrombosis, a multifactorial adverse event.

Those potential pitfalls have stimulated researchers to introduce more biocompatible polymers, innovative metallic platforms and new antiproliferative drugs, paving the way to second-generation DESs, such as everolimus and zotarolimus. Everolimus-eluting stents, in particular, were shown to offer some advantages in terms of restenosis and safety for re-infarction and stent thrombosis.

Results obtained with everolimus stents were satisfactory, but CABG is still superior to DESs, especially for complex lesions in terms of myocardial infarction, need for subsequent revascularization and potentially of mortality.

New technologies are offering an important veer towards new drugs, such as combination of dual antiproliferative drugs, or new materials or, particularly, the ‘absence’ of materials, such as bioabsorbable polymer or polymer-free DES systems or bioabsorbable DES. Continuous innovations

have generated an important bulk of data, with approximately 6000 articles in PubMed dealing with DES, and with further research to appraise new DES indications, point of strength and of weakness.

This book will try to offer a comprehensive view, starting from technical aspects of DES, to the development of various kind of stents and their clinical indications. We hope that you will find this book to be comprehensive and timely and we sincerely thank our colleagues for their efforts and expertise in making it possible to realize this work.

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