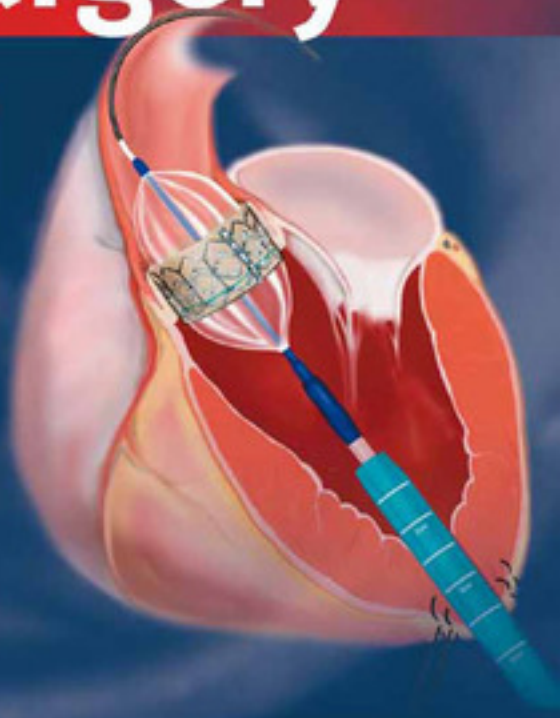
C. A. YANKAH
Y. WENG
R. HETZER
Editors

Aortic Root Surgery

The Biological Solution



Springer

C. A. Yankah ▮ Y. Weng ▮ R. Hetzer ▮ (Eds.)

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The Biological Solution

With 271 Figures in 434 Separate Illustrations, Most in Color, and 108 Tables

Springer

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To our families and loved ones,
whose unrelenting understanding of the demands of our surgical and scientific lives made this book possible

Preface

The surgical results of bioprosthetic aortic valve replacement in the 1960s and 1970s were not very satisfactory. The search for the ideal substitute for the diseased aortic valve led Donald Ross to develop the concept of the aortic allograft in 1962 and the pulmonary autograft in 1967 for subcoronary implantation, and later, in 1972, as a full root for replacing the aortic root in the infected aortic valve with a root abscess. The aortic allograft and pulmonary autograft surgical procedures were revolutionary in the history of cardiac valve surgery in the last millennium because they compete well with the bioprosthesis, are nonthrombogenic (thus, requiring no postoperative anticoagulation), are resistant to infection, restore the anatomic units of the aortic or pulmonary outflow tract, and offer unimpeded blood flow and excellent hemodynamics, giving patients a better prognosis and quality of life.

Surgery for congenital, degenerative, and inflammatory aortic valve and root diseases has now reached a high level of maturity; yet an ideal valve for valve replacement is not available. Therefore, surgeons are focusing their skills and their clinical and scientific knowledge on optimizing the technical artistry of valve-sparing procedures. In his honored guest address titled *Cardiac Valve Surgery – the "French correction"* delivered at the 63rd annual meeting of the American Association for Thoracic Surgery, April 25–27, 1983, Professor Alain Carpentier cautiously concluded on the basis of his experience with the first 95 cases of aortic valve repair and root remodeling between 1971 and 1982 that "it is too early to recommend these techniques. However they are a valuable alternative to valve replacement in children" (J Thorac Cardiovasc Surg (1983) 86:323–337). The ensuing 38 years have witnessed the advancement of his techniques of nonthrombogenic aortic valve repair and annuloplasty by Duran, Yacoub, David, and Elkins to become a realistic surgical procedure for selected groups of patients. David furthermore stressed the importance of the aortic sinotubular junction as a stabilizing factor for leaflet coaptation in the aortic root remodeling procedure.

Still the well-known dilemmas remain: on the one hand, the unpredictable durability of aortic valve repair and root remodeling procedures and of biological substitutes but, on the other hand, the need for anticoagulation in mechanical valves that otherwise guarantee long-term functioning. The choice of procedure is determined by the patient's age, metabolic and bleeding disorders, bleeding preconditions and such important issues as the desire to bear children in young women. Our approach has been problem-oriented and is largely based on 23 years' experience of 7000 patients with aortic valve and root diseases at the Deutsches Herzzentrum Berlin.

It is for the busy practitioner that the Berlin Heart Valve Symposium held November 27–30, 2008, was organized, and we are grateful to be able to complement our experience with that from other institutions in chapters for this third symposium volume on *Aortic Root Surgery – The Biologic Solution* by internationally renowned experts in this field.

This volume focuses on current surgical approaches to and evolving trends in aortic valve repair and root remodeling techniques and replacement, the Ross operation, advances in minimally invasive transfemoral and transapical aortic valve replacement, ablation techniques for atrial fibrillation, tissue engineering of heart valves, multimodality imaging, and anticoagulation. The Ross operation has earned an important place in the pediatric and adolescent age group, because of the potential of the pulmonary autograft to grow, whereas the use of aortic allograft has been limited to the reconstruction of the right ventricular outflow tract (RVOT) and to the treatment of complicated active infective endocarditis. Besides cellular allografts and decellularized allografts (SynerGraft, CryoLife Inc. Atlanta, GA, USA), several biological xenografts such as the Contegra bovine jugular vein conduit (Medtronic, Inc., Minneapolis, MN, USA) and the AutoTissue (AutoTissue, Berlin) have been used to reconstruct the RVOT after Ross operation, but none could last for the lifespan of the patient without potential drawbacks. The chapter on tissue engineering discusses the state-of-the-art of decellularized allograft tissue for repopulation of autologous cells to form biocompatible tissue and, therefore, enhance durability in younger age groups. The spectacular innovative minimally invasive transcatheter aortic valve replacement technology with the Edwards Sapien, CoreValve, and Sadra Lotus valves which was pioneered by Cribier, Grube, Webb, Mohr, and Walther is an option that may offer hope to patients who have few or no treatment alternatives because of high operative risks.

We trust that our efforts have resulted in a volume that will provide a highly authoritative reference source for the family practitioner, internist, pediatrician, cardiologist, and cardiovascular nurse and surgeon treating patients with aortic root disease.

Berlin, August 2009

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