

# Preface

This volume is a follow-up to the book *Cardiac Reconstructions with Allograft Valves*, which was written with five contributors and an outstanding artist. Since its publication in 1989, the information in this field has increased dramatically, paralleling the increased clinical use of cardiovascular allograft tissues. Many new techniques have been developed and refinements of the older techniques have been published based on the experiences of many surgeons. In addition, the fundamental biology of valve transplantation and especially the use of cryopreservation to facilitate transplantation, has been a major focus of research. Thus, much more is known about these tissues than at the time of the writing of the first book. Because of this progress, a new volume seemed appropriate. Because cryopreserved cardiovascular tissues are also used without valves for many important reconstructions, I decided to expand the focus of the book, and thus the slight modification in the title. More than two-thirds of this book is new material.

The book has also undergone another fundamental change. While the first edition was predominantly written by the main author, to include much of the available knowledge in this field, this new edition mandated a contributor format. These experts explore the fundamental scientific basis of this field which is critical to an understanding of allograft tissues. Most sections have been rewritten to reflect increased clinical and research experience.

Other important additions include a special section on biochemical and morphologic studies of explanted experimental animal and clinical human valves. Because many of the fundamental clinical concepts are based on the experience of a relatively small number of centers actively transplanting homografts in the 1970s and early 1980s, I solicited summarized versions of results from the surgeons and their colleagues who contributed importantly to this early phase (Chapter 2–7). The basic cell biology of these tissues has been investigated by a number of focused laboratories (including our own), requiring complete revisions and expansions of the relevant chapters (8–30). Cryopreservation protocols have matured based on significant research, thus mandating a major rewriting of Section VIII by the authors from LifeNet Tissue Services.

The information presented firmly resolves the question of chronic interstitial leaflet cell viability following cryopreserved cardiac valve allotransplantation—the nails are driven into the coffin of the prolonged cell survival theory. An alternative theory for how and why homografts actually perform so well is presented based on significant laboratory and human data. The resolution of the conflicting theories of prolonged cell viability following cardiac valve transplantation is summarized in Chapter 20. This biology is a fascinating but constantly moving target. As biological modifications ensue with genetic, molecular and cellular manipulations of these allograft tissues, these will be an ever-expanding need for the surgical techniques of cardiac reconstructions described in this book.

Allograft tissue transplants are increasingly used by all cardiac surgeons, but are particularly important for pediatric patients as a consequence of special advantages in highly complex congenital lesions. The availability of cryopreserved allografts has initiated a wave of surgical creativity which is reflected in the marked expansion of the chapter on left ventricular outflow tract reconstructions, especially for complex neonatal problems. The growing role for autologous valve transplant procedures (e.g., Ross operations) in both children and adults has mandated marked expansion of the techniques depicted. Many new surgical methods are described, and older techniques have been refined. In addition, surgical techniques used with allografts are also applicable to unstented xenografts, so new sections have been added to depict the evolution of ventricular outflow tract reconstruction from root replacements, through “miniroots” and autografts, to the implantation methods for unstented xenografts.

As in the first edition, certain conventions are used. Half-tone or carbon dust figures are used to depict surgical techniques as viewed from the surgeon’s perspective. Repetition of steps in the depiction of various surgical techniques spares the reader the need to flip pages. The terms “homograft” and “allograft” are used interchangeably as no purpose is served by a pedantic argument about which is more correct today.

All surgeons performing pediatric and/or adult valve replacements and reconstructive cardiac surgeries should be interested in these methods. Cardiothoracic residents and cardiologists will find the volume useful. Most of the surgical techniques have been used by me. When contributors’ techniques vary from my own, I have noted optional variations or have noted my preferences. Refinements are based on my own personal experience exceeding 600 allograft and autograft reconstructions spanning the age spectrum of premature neonates to adults in their seventh decade, and now including shuntless valves.

Cryopreserved allograft tissues are now standard materials for the reconstructive cardiac surgeon. Surgical reconstructive methods continue to be refined and new approaches developed. Both surgical techniques and notions about the nature of this tissue we are transplanting have evolved. Putting all of this into perspective required the addition of a thirteenth section “Future Directions” with the intent of creating a critical rationale for valve replacement choice and to suggest future

directions for basic and applied research, just at the start of a new era based on bioengineering which will involve decellularized and recellularized valves. For surgeons facing challenging cardiac reconstructions, an enhanced understanding of the biological/material properties of allografts and a broadening of the range of surgical techniques for which these are applicable, are the fundamental purposes of this book.

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