



Tissue and Cell Clinical Use

AN ESSENTIAL GUIDE

EDITED BY

Ruth M. Warwick and Scott A. Brubaker



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Foreword

Clinical allograft transplantation of various body parts has a long and sometimes disturbing history. Many authors have commented on the old historical events surrounding Saints Cosmas and Damian, who were from the Turkish region and practiced medicine. It was said that they were beheaded by the Emperor Diocletian in the third century AD because they were Catholics. However, they returned in the fifth century to perform the “Miracle of Black Leg” as a remarkable treatment for the soon-to-become Roman Emperor, Justinian, for a cancer of his extremity. The origin of the black limb that they transplanted was from a Moor who had died that morning, and the transplant was performed after amputation of Justinian’s limb. The success of the procedure was certainly questionable but several events occurred as a result. First, almost every artist of the Renaissance became intrigued by the procedure, which resulted in hundreds of remarkable artworks displaying it. Secondly Cosmas and Damian were canonized in 570 and became saints. Finally, the alleged site of the operative procedure was in a church in the Roman Forum, which is now titled the Basilica Cosma e Damiano. Thus, the concept of transplantation from one individual to another has caught the imagination of generations during the past 14 centuries. Slowly, evidence has accrued about its benefits but, along with much success, we are now venturing into gathering information to manage and prevent adverse outcomes. Understanding biology continues to evolve.

The first clinical bone allograft transplantation was in 1881, when William MacEwen used the technique to treat a 3-year-old child with osteomyelitis of the humerus. Eric Lexer in 1908 reported four such procedures about the knee

and in 1925 described a reasonable success rate with 34 joints. Since then numerous programs have reported many allograft transplants, including those of Volkov in Russia, Frank Parrish in Houston, Texas, Carlos Ottolenghi in Buenos Aires, Istituto Rizzoli in Bologna, the Mayo Clinic and Bill Tomford, Henry Mankin, and Francis Hornicek at the Massachusetts General Hospital. Development of the National Naval Tissue Bank in 1991 by George Hyatt and Kenneth Sell was of considerable value, and its remarkable capacity to train numerous individuals led to the development of tissue banks in a variety of centers. It was Curtiss and his group who demonstrated that freezing the tissue improved outcome, and Friedlaender and Strong showed that patients with MHC class II antigens did better than those with class I or those with mismatch. There were additional benefits to improved survival of the cartilage of joint allografts from the use of glycerol and dimethylsulfoxide. Careful clinical follow-up with outcome reporting and collation provide evidence for advancement in this important, developing field. My personal interest has been in orthopedics but it is clearly only one of a variety of disciplines that have benefited from allograft use. This volume seeks to describe the clinical use of many different cell and tissue allografts to address multiple conditions.

It should be apparent to the readers of this volume that the difficulties associated with variation in cellular elements, tissue structure, bacterial contamination, and very slow regeneration result in complications and in some cases, significant system failures. It is not just the bone and other tissue allografts that have the remote but discrete possibility of developing this array of problems: all forms of allograft transplantation, including organ transplantation and haemopoietic stem cell transplants, can develop serious complications and result not only in failure of the system but potentially threaten the life of the graft recipient. Other

recipients, who might receive an allograft from the same donor or the same batch of materials, can also be at risk. It is noteworthy that this book contains descriptions of recent advances in vigilance and surveillance of substances of human origin and I commend this.

The information provided by the authors in this volume clearly defines the clinical advantages and the potential and real problems associated with allograft transplant of all sorts, including those in new and developing fields such as complex tissue grafts of the hand and face as well as in my own area of large bone segments. The chapters offer the readers a major opportunity to review the advantages and as well as problems that have resulted. Ultimately, it is the balance between the advantages and the disadvantages that lead to patient benefit in the long term. This will improve the success of allografting, whether it is a stem cell or large allograft.

As a performer and caring physician for many patients with allograft bone transplants and as a teacher, it is my privilege and my honor to have the opportunity to introduce the subject with this foreword. I am hopeful that some of this discussion will increase the depth of understanding of the excellent presentations by the multiple outstanding authors of the chapters, and that this important didactic book, with its case studies and learning points in each chapter, will continue the critically important task of teaching and educating professionals working in, and regulating, diverse fields associated with tissue and cell allografting.

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Preface

This book on the use of donated tissues and cells is the third in a series of three. The first was published in 2009. Its 13 chapters focused on the human dimensions of donation, addressing the topic from the history of the discipline, through donor recruitment and consent, medical and behavioral history taking, to the role of donor testing and the management of test results. Case studies demonstrated the diversity of the field in different cultural and economic realities, and issues relating to the care of the professionals who undertake rewarding but sometimes arduous, emotional duties were discussed. The first book also covered aspects relating to the donation of hemopoietic stem cells, the reproductive context, and the role of clinical governance in tissue and stem cell banks.

The second book is published in parallel with this third book and covers all aspects of recovery and processing of tissues and cells, including collection of reproductive donations and hemopoietic stem cells, and the training of staff in these disciplines. The foreword to the first book was written by Professor Rafael Matesanz from the Spanish National Transplant Organisation in Madrid. Dr Matesanz describes two things that should always be strictly linked to assure a solid foundation for a transplant system to offer the best opportunities and results for patients: technical quality standards and ethics. This is true for the donation aspects and for the use of donated tissues and cells. We invited international experts to collaborate with us in developing this book so that our readers would have access to a broad reference from the expert surgeons and physicians using tissues and cells, with evidence from the literature on the clinical benefits of these invaluable donations.

This volume is designed in a similar format to its sister books. It has 20 chapters and includes cases and learning points. We cover the same fields as the first two books and deal with the application of tissues and cells by those working in the clinical field. Similarly, this volume has a cross-continental editorship and chapters co-authored by experts in their field with representation from all over the world in an attempt to provide a global perspective. We are especially honored that Dr Henry Mankin has written the foreword to this third book. He has commented on the long history of the use of allografts and the advances that have made their use an essential part of the armamentarium of doctors in many specialties. This is an important point from him because he has been recognized as an innovator and expert clinician in the use of allografts in orthopedics, in which he has been working for over 50 years. He started orthopedic residency at the Hospital for Joint Diseases in New York City and later became orthopedist-in-chief at Massachusetts General Hospital and a professor at Harvard. He has several specialty interests including in Gaucher's disease and in the use of major bone allografts. He has developed a computerized system for following the 18 000 tumor cases that he and his unit have treated over many years. The more than 600 papers published by his team is an extraordinary literature on the evidence of benefit from the use of donated bone. He has recognized in his foreword that although allografts carry many advantages, there are also risks associated with their use. We have structured this book in a way that allows clinicians to weigh up these two opposing aspects of allografts and to make informed choices on when to use them. Information is provided on how to recognize adverse reactions and to collaborate with the clinical allograft network to promote maximum safety.

The book starts with a chapter on the ethics of the use of allografts, a subject fundamental to the continuing support