Books on Cardiac Surgery and Extracorporeal Circulation

"History is neither more nor less than biography on a large scale."

Alphonse de Lamartine (1790-1869) French author, poet, historian, and statesman

1990s

Austin JC, Harner DL. The Heart Lung Machine and Related Technologies of Open-Heart Surgery. Phoenix: Phoenix Medical Communications, 1990. [The authors admit this book was intended to provide a brief overview about the "technology of open-heart surgery." They describe the history of the circulation (Galen, Harvey) and early work on extracorporeal circulation (LeGallois, Ludwig and Schmidt, von Schroeder, Frey and Gruber, Carrel and Lindberg, and Gibbon). There are two physiology chapters, several on components of heart-lung machines, a section on techniques and problems, and two chapters on the effects of open-heart surgery followed by a provocative one entitled, "Desires, Needs, and Conclusions." An appendix includes normal laboratory values and hemodynamic parameters. A list of general references lists other books on the topic, and there are many illustrations.]

Hensley FA Jr., Martin DE (Eds.) The Practice of Cardiac Anesthesia. Boston: Little Brown and Co., 1990. [This small but jam-packed book is a basic introductory handbook and has chapters written mostly by anesthesiologists in outline format for brevity and quick reference by clinicians. It is liberally illustrated, and one chapter co-authored by two perfusionists (D. Williams, M. Kurusz) reviews circuits and topics such as the goals of cardiopulmonary bypass (CPB), priming, malfunctions, safety devices, and portable CPB for emergency situations.]

Waldhausen JA, Orringer MB (Eds.) Complications in Cardiothoracic Surgery. St. Louis: Mosby Year Book, 1991. [As the title announces, the focus of this text is entirely on what can go wrong during cardiac surgery, cardiac anesthesia, and cardiopulmonary bypass. Not surprisingly, contributors are overwhelmingly cardiac surgeons. Notably, after the sobering litany of possible complications, one major section has 16 chapters on management of complications should something potentially disastrous occur. The text contains excellent figures, tables, and photographs.]

Romaine-Davis A. John Gibbon and His Heart-Lung Machine. Philadelphia: University of Pennsylvania Press, 1991. [This is the definitive biography of Dr. John H. Gibbon, Jr. It is liberally illustrated and contains verbatim records on the development of the heart-lung machine over the course of Dr. Gibbon's career and the failures surrounding its first successful clinical use in May 1953. The author provides a detailed record from exhaustive research.]

Kay PH (Ed.) Techniques in Extracorporeal Circulation, Third Edition. Oxford, UK: Butterworth Heinemann, 1992. [This updated edition was published 16 years after the first edition. Notably, company engineers (from Cobe and Dideco) authored two chapters on the design and principles of

extracorporeal circuits and compared membrane and bubble oxygenators. Most authors were British physicians, and there were no clinical perfusionist contributors. Besides having a reasonable history chapter, there is a chapter on the future of extracorporeal circulation with an emphasis on long-term cardiopulmonary support.]

Engelman RM, Levitsky S (Eds.) A Textbook of Cardioplegia for Difficult Clinical Problems. Mount Kisco, NY: Futura Publishing Co., 1992. [Over 60 international contributors discuss the history, chemical composition, and efficacy of cardioplegic regimens as elucidated in the laboratory and from clinical experience. Many of the authors presented their work at the Conference on Cardioplegia held in Oxford, UK in 1990. The book has 28 chapters, all written by physicians from around the world, including four PhDs and one RN. Methods of myocardial preservation were varied and, in the words in the Preface written by Dr. F.C. Spencer, "astonishing", which he attributed to "the evolving nature of the field." At the time, effective myocardial function was assessed simply by myocardial function after the operation, myocardial infarction, or death. However, the use of better monitoring such as continuous myocardial pH or temperature probes was beginning to be used. Topical hypothermia was suggested as inadequate compared with perfusion of the heart with cold, hyperkalemic crystalloid or blood-based solutions. The first chapter by Dr. John W. Kirklin notes the emphasis during the early days of cardiac surgery was to provide the surgeon with a "perfectly quiet and bloodless field." Concerns over myocardial preservation followed about a decade later as more collective experience grew. This text covers state-of-the-art practice at the time of publication.]

Shumacker HB Jr. The Evolution of Cardiac Surgery. Bloomington, IN: Indiana University Press, 1992. [This masterful treatise has chapters organized by disease states and describes operations used to treat the pathologies. Importantly, there are chapters on the development of heart-lung machines, ventricular assist devices and the artificial heart, and mechanical heart valves. The references alone constitute 90 pages of all relevant scientific publications related to the development of cardiac surgery. This is an important resource for anyone's library.]

Lee ME. Near Misses in Cardiac Surgery. Boston: Butterworth-Heinemann, 1992. [The glib and entertaining text in this book briefly describes 40 purportedly real clinical dilemmas drawn from the author's unlucky experience, after which the author offers lucid "solutions" and discussion supplemented with a few relevant references for each. The author asserts, "We are surrounded by assassins at every turn." To effectively combat them, he urges teamwork manifested by constant vigilance, communication, and standardized and simplified approaches for all clinicians entrusted with delivery of care for the cardiac surgery patient.]

Arensman RM, Cornish JD (Eds.) Extracorporeal Life Support. Boston: Blackwell Scientific Publications, 1993. [This was the first book to use the phrase extracorporeal life support in its title, which heretofore was generally known by the acronym ECMO (extracorporeal membrane oxygenation). Both editors were early advocates of prolonged extracorporeal support, one in Chicago and the other in Atlanta. They recruited other clinicians and researchers and one clinical perfusionist (G. Whittlesey) to describe their best understanding at the time of life-saving

pulmonary and/or cardiac support in the Intensive Care Unit. Two superb chapters by Drs. C. Walton Lillehei and Robert H. Bartlett describe the history of extracorporeal circulation as used for cardiac surgery (many photos of first-generation circuits) and prolonged extracorporeal support that led to the formation of the Extracorporeal Life Support Organization (again illustrated with many historical photos of circuits and patients). The last chapter offers a provocative look to the future of the technology by Dr. Bartlett.]

Pifarre R (Ed.) Anticoagulation, Hemostasis, and Blood Preservation in Cardiovascular Surgery. Philadelphia: Hanley & Belfus, Inc., 1993. [Topics such as anticoagulation, blood conservation, salvaged (cell saver) blood syndrome, and platelet activation are reviewed. The final chapter by two lawyers, entitled "Medicolegal Aspects of Blood Transfusions" is thought-provoking.]

Gravlee GP, Davis RF, Utley JR (Eds.) Cardiopulmonary Bypass; Principles and Practice. Baltimore: Williams & Wilkins, 1993. [The first edition of what would become a widely used textbook was edited by two anesthesiologists and one cardiac surgeon. Five sections cover all conceivable applications of the technology. The history chapter by Dr. C.W. Lillehei is extraordinary in scope from one who lived the early experiences and is often referred to as the father of cardiac surgery. The third section on coagulation management is one of the best reviews for insight on this complex topic. Chapters on the effects and clinical applications follow, and appropriately, the last chapter addresses termination of cardiopulmonary bypass.]

Smith PL, Taylor KM (Eds.) Cardiac Surgery and the Brain. London: Edward Arnold, 1993. [This book updates concerns by cardiac surgeons and anesthesiologists, mostly from the United Kingdom, over neurological dysfunction and psychological problems in patients after open-heart surgery. Authors in three sections first address the extent of the problem, then describe investigative methods to define adverse manifestations, and, lastly and importantly, suggest interventions that can be undertaken to minimize risks. Clearly, and as noted by the editors, more research is called for to make progress in improving patients' whole lives and not just their hearts after open-heart surgery.]

Quaal SJ. (Ed.) Comprehensive Intraaortic Balloon Counterpulsation, Second Edition. St. Louis: Mosby, 1993. [The editor's background was as a nurse, albeit with a PhD degree and certifications in critical care, based in the Veterans Affairs Medical Center in Salt Lake City, UT. Besides authoring no less than 13 of the 35 chapters herself, she recruited many fellow nurses, cardiac surgeons, cardiologists, and company engineers and scientists—all with extensive experience with the intra-aortic balloon pump (IABP), which curiously is abbreviated as the less common IABC, standing for intra-aortic balloon counterpulsation. The chapters are well-illustrated. The Foreword is written by one of the original physicians (Dr. S.D. Moulopoulos) who demonstrated the concept of balloon pumping in the animal laboratory. No reference on the IABP would be complete without a chapter written by its acknowledged inventor and proponent, Dr. Adrian Kantrowitz, and he writes of the parameters to guide balloon pump weaning after a patient's heart has recovered. There is a section devoted to special situations such as ambulation with a balloon in place, transport, pediatric applications, and, as is so often the case, a closing chapter on the future.]

Willner A (Ed.) Cerebral Damage before and after Cardiac Surgery. Dordrecht: Kluwer Academic Publishers, 1993. [This is yet another book on the brain and cardiac surgery. Early researcher and cardiac surgeon Dr. T. Åberg writes in the Preface that of all the possible complications that might occur after open-heart surgery, subtle changes affecting a person's intellect, memory, personality, and emotional life are the most feared. He goes on to suggest cerebral protection is the "major remaining perioperative challenge from a scientific view" yet had been somewhat neglected for many reasons, not the least of which was how to best measure brain function. The good news he reports is that the subject was receiving more attention at the time of publication of this text. There are chapters on causes, evaluation techniques, and the less often studied psychological and psychopathology problems exhibited in many patients who survive cardiac surgery.]

Jonas RA, Elliott MJ (Eds.) Cardiopulmonary Bypass in Neonates, Infants and Young Children. Oxford, UK: Butterworth Heinemann, 1994. [The always challenging practice of performing cardiac surgery and cardiopulmonary bypass (CPB) in the very young is covered thoroughly by authors selected by two notable pediatric cardiac surgeons—one from Children's Hospital in Boston and the other from The Hospital for Sick Children at Great Ormond Street in London. The historical perspective in the first chapter rightly points out the advancements realized about 1970 when deep hypothermia and circulatory arrest were used to perform primary intracardiac repairs in neonates and infants. The pioneering concept of ultrafiltration during pediatric perfusion greatly improved fluid management during and after CPB and is the subject of a chapter by one of the editors. Importantly, two appendices describe perfusion protocols and equipment used at the editors' centers.]

Stafford TB, Toomasian JM, Kurusz (Eds.) Case Reports I; Clinical Studies in Extracorporeal Circulation. Houston: PREF Press, 1994. [Meetings featuring only case reports began in the early 1990s, and this volume was produced by the Perfusion Research and Education Foundation from edited transcripts and discussions. The cases predated HIPAA rules that went into effect in 1996. While generally thought of as lesser in importance than controlled and randomized clinical studies, case reports such as those reported herein had lessons on how challenging cases and problems were handled by cardiac surgical teams.]

Brodie JE, Johnson RB. The Manual of Clinical Perfusion, First Edition. Augusta, GA: Glendale Medical Corporation, 1994. [Touted as the *"pocket guide to perfusion"*, this wildly popular book was authored by two practicing perfusionists. To meet sales demand, a second printing occurred in 1997. Using straightforward language, the authors cover all facets of perfusion from anatomy to ECMO. Chapters dedicated to congenital pathology, pharmacology, and blood gases will no doubt appeal to students. Conversely, the seasoned perfusionist will appreciate in-depth discussions on cardiac angiography and sequelae of cardiopulmonary bypass. Though presented as a quick reference, this manual is comprehensive in content for both beginners and veterans of perfusion technology.]

Mora C (Ed.) Cardiopulmonary Bypass; Principles and Techniques of Extracorporeal Circulation. New York: Springer-Verlag, 1995. [This is a major textbook with well-known contributors, including more than ten clinical perfusionists working at Emory University School of Medicine. There is a wonderful chapter on the history of cardiopulmonary bypass (CPB) co-authored by Dr. Pierre M. Galletti and the editor, which has many photographs of early equipment and devices. They note the three major evolutionary phases of use of CPB began with repair of congenital defects, followed by artificial heart valve surgery, and finally the "explosive growth of aortocoronary bypass surgery."]

Siposs GG. The Green Team; A Techno-Medical Thriller. Chapel Hill, NC: Professional Press, 1995. [A killer is loose in a California hospital and the heart team is his next target. It's up to perfusionist Beth Masters to save herself and her co-workers. This fictional story penned by Siposs, founder of the medical company American Omni, is an enjoyable read with lots of twists and turns.]

Zwischenberger JB, Bartlett RH (Eds.) ECMO; Extracorporeal Cardiopulmonary Support in Critical Care. Ann Arbor, MI: Extracorporeal Life Support Organization, 1995. [This first compendium of several volumes that would follow at five-year intervals and was dubbed the "ECMO Red Book." It became a vital resource for clinicians undertaking the establishment of ECMO programs worldwide. Chapter 2 recounts developmental landmarks in prolonged extracorporeal circulation and the charter meeting of the Extracorporeal Life Support Organization (ELSO) held in 1989. Sections on all patient populations treated with ECMO (neonates to adults) and the equipment and management required for starting a successful program are detailed within pages of this text. The last chapter, not surprisingly, speculates on the future of the expanding technology that would become commonplace in many hospitals in the coming decades.]

Hensley FA Jr., Martin DE. (Eds.) A Practical Approach to Cardiac Anesthesia, Second Edition. Boston: Little Brown & Co., 1995. [This edition followed the same format as the first one published five years earlier but differed insofar as its physical dimensions changed, and it would no longer easily fit in a lab coat or scrub suit pocket. The outline arrangement of the text and use of bold font headings make it a handy reference for all aspects of anesthetic management of patients during cardiac surgery, specific cardiac disorders, circulatory support, and organ preservation. The last section has chapters on thoracic anesthesia and pain management. The illustrations and tables, many reproduced from other texts, are bountiful and help convey key information about drugs, devices, and patient anatomy.]

Toomasian JM, Stafford TB, Kurusz M (Eds.) Case Reports II; Clinical Studies in Extracorporeal Circulation. Houston: PREF Press, 1996. [This volume followed the first one published one year earlier and had 22 chapters recounting challenging cases. One chapter presented case scenarios from the "Pathophysiology and Techniques of Cardiopulmonary Bypass" symposium held in San Diego in 1995. Two cardiac surgeons, two cardiac anesthesiologists, and two clinical perfusionists reacted to and discussed how they would handle specific problems that might arise during open-heart surgery. The last chapter presented a mock trial with participants role-playing as plaintiffs, defendants, and attorneys followed by a transcript of audience discussions on what they had heard.]

Stammers AH (Ed.) Cardiopulmonary Bypass: Emerging Trends and Continued Practices. Boston: Little, Brown and Co., 1996. [This monograph is Vol. 34, No. 2, published by International Anesthesiology Clinics. The editor was a perfusion educational program director. Several chapters are written by clinical perfusionists covering common topics such as oxygenators, myocardial preservation, cardiac assist devices, blood reactions and hemostasis, pediatric perfusion, and deep hypothermia with circulatory arrest. There is one chapter on microprocessor technology as used in modern extracorporeal circulation equipment.]

Khonsari S. Cardiac Surgery; Safeguards and Pitfalls in Operative Technique (Second Edition). Philadelphia: Lippincott-Raven Publishers, 1997. [The focus of this book is on operative techniques for all types of cardiac surgery. The illustrations are plentiful and superb. Each chapter includes brief highlighted notations on complications to avoid. There are chapters on cannulation, myocardial preservation, and venting and deairing of the heart, which are relevant to clinical perfusionists.]

Westaby S, Bosher C. Landmarks in Cardiac Surgery. Oxford, UK: Isis Medical Media, Ltd., 1997. [This remarkable, hefty book is well-illustrated and has chapters on the development of cardiopulmonary bypass and mechanical circulatory support. An added feature is reproduction of landmark journal articles documenting important contributions to cardiac surgery.]

Shumacker HB Jr. A Dream of the Heart; The Life of John H. Gibbon, Jr., Father of the Heart-Lung Machine. Santa Barbara, CA: Fithian Press, 1999. [The author, a notable cardiac surgeon and historian, was a close friend of Dr. Gibbon, and this biography provides details of his life and events surrounding development of the heart-lung machine and its early clinical use in Philadelphia in the early 1950s.]