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

1980s

Wertenbaker L. To Mend the Heart. New York: Viking Press, 1980. [This book is characterized as a "medical adventure story" by the author, who recounts the early development of cardiac surgery and its pioneers who made it possible. The Foreword is written by pioneering cardiac surgeon, Dwight Emary Harken, who poignantly and in compelling detail recounts his and other surgeons' early failures for mitral valve operations. There are chapters on artificial heart valves and pacemakers and a glossary at the end.]

Cardioplegia: The First Quarter Century. Proceedings of an International Symposium at the Royal Society. London, 1980. [This manuscript contains a collection of papers presented by authorities on cardioplegia at the distinguished St. Thomas' Hospital in London. A symposium was held over two days in June 1980 and was organized by eminent surgeons/researchers Drs. D. Hearse, M. Braimbridge, D. Melrose, H. Bentall, R. Litwak, and G. Rodewald. Companies Bayer (UK) and Travenol (USA) funded the cost of the proceedings (paperback) with no apparent copy editing. The symposium is aptly named - owing to Melrose's original 1955 publication in *The Lancet* entitled, "Elective Cardiac Arrest – A Preliminary Communication." Nearly one hundred papers are included from all over the world. The first entry is a beautifully written piece by Melrose on the origins of elective cardiac arrest. What follows are topics ranging from myocardial ischemic injury to cardioplegic composition and everything in between. Luminaries such as Drs. C. Barnard, V. Bjork, H. Bretschneider, G. Buckberg, A. Carpentier, V. Gott, S. Levitsky, P. Menasche, B. Roe, A. Starr, F. Tyers, and A. Wechsler all contributed their expertise. This rare compilation is a must-read for perfusionists interested in the history and evolvement of cardioplegic solutions and techniques.]

Ionescu MI (Ed.) Techniques of Extracorporeal Circulation, Second Edition. London: Butterworths, 1981. [This is an update of the editor's original book with the word "Current" omitted from the title. The contributors were all physicians except for three perfusionists: Anna Mae Fosberg (Brigham and Women's Hospital); Susan M. Haubert (Columbia Presbyterian Medical Center); and Colin Green (Polystan). The Preface notes all contributors attempted to summarize the major technical problems associated with cardiopulmonary bypass but acknowledged that answers to many of the known problems were yet to be discovered.]

Mohri H, Dillard DH. Hypothermia for Cardiovascular Surgery. Tokyo: Igaku-Shoin, 1981. [This book describes clinical practices at the authors' institutions (Yamaguchi University School of Medicine in Ube, Japan and the University of Washington School of Medicine in Seattle, WA). It contains many photographs, tables, and figures. Chapter 8 reports the methodology and results of surgeons

at other institutions using deep hypothermia and circulatory arrest for repair of pediatric congenital cardiac defects. There is an extensive reference list.]

Longmore DB (Ed.) Towards Safer Cardiac Surgery. Lancaster, UK: MTP Press, 1981. [This was based upon the proceedings of a symposium held at the University of York, UK in April 1980. The editor, Donald B. Longmire, was a physiologist from the National Heart Hospital in London, and many of the chapters are from British researchers. There are five sections: Aspects of Cardiac Surgery; Aspects of Cardiopulmonary Bypass and Anaesthesia; Aspects of Postoperative Care (Parts 1 and 2); and The Brain. A final section contains the Sir Thomas Holmes Sellors Lecture dealing with myocardial preservation and includes commentary from Dr. H. J. Bretschneider and colleagues in Germany. The concluding section of the book summarizes what was accomplished and what remained to be done in the "exciting specialty which offers unrivalled opportunities of working on the edge of many new frontiers…Without those apparently fearless, perceptive and of times ruthless clinical and intellectual pioneers, the first patients would never have been put on bypass." Suggested key words for safety were the five "Cs": "Care, Common sense, Communication, Collaboration and Computers."]

Hearse DJ, Braimbridge MV, Jynge P. Protection of the Ischemic Myocardium; Cardioplegia. New York: Raven Press, 1981. [The authors are renowned for their early research at St. Thomas' Hospital in London. For a time, their crystalloid cardioplegic composition became the most copied solution in the world. The Foreword was written by an early pioneering cardiac surgeon, Denis Melrose from the Hammersmith Hospital in London.]

Utley JR (Ed.) Pathophysiology and Techniques of Cardiopulmonary Bypass, Vol. 1. Baltimore: Williams & Wilkins, 1982. [This monograph brought together many experts to report their current understandings of the physiological effects of cardiopulmonary bypass and to discuss current controversies. All authors, save one (Mary Hartley-Winkler), were Medical Doctors.]

Becker R, Katz J, Polonius M-J, Speidel H (Eds.) Psychopathological and Neurological Dysfunctions Following Open-Heart Surgery. Berlin: Springer-Verlag, 1982. [This book reported on the Proceedings of the Second International Symposium on Psychopathological and Neurological Dysfunctions Following Open-Heart Surgery, held in March 1980 in Milwaukee, WS. The Foreword, entitled "The Surgeon as a Humanist", is thought-provoking and characterized the cardiac surgeon as a "modern day thaumaturge" or magician and worker of miracles. From such lofty language, the chapters cover all aspects of postoperative neurological and psychiatric complications and care for adults and children so afflicted after cardiac surgery. One section addresses the influence of surgical technique on postoperative complications and compares bubble and membrane oxygenators, drug interventions to minimize cerebral damage, bubble microembolization, the effects of pulsatile flow, and arterial line filtration. There are transcripts of some discussions that followed presentations at the meeting.]

Utley JR (Ed.) Pathophysiology and Techniques of Cardiopulmonary Bypass, Vol. 2. Baltimore: Williams & Wilkins, 1983. [This monograph is the second in a series by the organizer of the annual

Cardiothoracic Symposium—this one had been held in San Diego in February 1982. Topics range from basic science, organ function, organ physiology, biochemistry, and practical uses of devices and components of the heart-lung machine. Atypically for a clinical book, there is one chapter on legal implications of cardiopulmonary bypass. Two chapters have perfusionist co-authors (D.B. Stephens, W. Williams) paired with the surgeons they worked with.]

Derloshon G. One for the Heart; The Story of The Professor Viking O. Björk. Irvine, CA: Shiley, Inc., 1983. [This monograph was published by an oxygenator manufacturer and recounts the many contributions, travels, and lectures of a pioneering cardiac surgeon. Topics include the use of mechanical ventilation, artificial heart valves, and the disc-type extracorporeal oxygenator, which enabled the first successful dog perfusions in the late 1940s and became the basis for the subject's doctoral dissertation.]

Hagl S, Klovenkorn WP, Mayr N, Sebening F (Eds.) Thirty Years of Extracorporeal Circulation 1953-1983. Munich: Carl Gerber, 1984. [This is a large compendium of papers presented at a symposium held at Deutsches Herzzentrum München in April 1984. Notably, there are edited discussions that followed many of the presentations. The first part has three chapters on the history of extracorporeal circulation with reproductions of early circuits as used by physiologists in the 19th century as well as blood pumps from the 20th century. Effects of perfusion on organ systems are well-covered. Part 6 is devoted to technology, and the closing session entitled, "Extracorporeal circulation in 1984" poses questions on the best devices, monitoring, and known problems, thus leaving readers to seek the answers.]

Bigelow WG. Cold Hearts; The Story of Hypothermia and the Pacemaker in Heart Surgery. Toronto: McClelland and Stewart, Ltd., 1984. [The use of early pacemakers arose from the author's research on hypothermia as applied to cardiac surgery. There are descriptions of early uses of hypothermia to enable open-heart surgery by Drs. W. Mustard, H. Swan, and W. Bigelow. Dr. John Lewis in Minneapolis reported the first use of hypothermia to close an atrial septal defect in a child in 1952 using Bigelow's methods. The first successful case using a heart-lung machine by Dr. John Gibbon, Jr. in 1953 is briefly recounted; the second successful case was removal of a heart tumor by Dr. Clarence Crafoord. The author pays tribute to Drs. C. Walton Lillehei and John Kirklin for performing surgery on a series of patients with congenital cardiac defects that showed the potential for open-heart surgery. There is an insightful chapter entitled, "Research: Lessons and Reflections", and the book has many illustrations.]

Shaw MW (Ed.) After Barney Clark; Reflections on the Utah Artificial Heart Program. Austin: University of Texas Press, 1984. [This book appeared two years after the first permanent artificial heart implantation in December 1982 and contains chapters examining the broader societal implications of this monumental achievement. Authors from well-respected institutions and varying disciplines had attended a conference seven months after the patient's death to consider the publicity, ethics, and rights to privacy that became controversial after the historic operation. There is no chapter describing details of the operation; however, two appendices include the very long consent form used for the procedure and a list of publications by the surgeon, Dr. William C.

DeVries. Among the citations listed was the first presentation about the case at a perfusion meeting that was given by the perfusionist, Douglas L. Smith, just a few weeks after the implantation. The patient at that time was still alive but would succumb some 112 days later after suffering several strokes and never left the hospital with his new mechanical heart.]

Smith GH. Complications of Cardiopulmonary Surgery. London: Baillière Tindall, 1984. [The stated target audience for this book was cardiothoracic trainees. There are two chapters dealing with cardiopulmonary bypass with the first on common hazards such as arterial air embolism, bleeding, cannulation, priming fluids, and oxygenator and pump problems. Another chapter focuses on drug-related problems. Some recommendations are debatable such as use of silicone tubing in the roller pump and the bizarre statement, "The major complication associated with the use of heparin is that, for some reason, it may not be given to the patient." Each chapter contains short lists of relevant references for "further reading" instead of more conventional specific footnoting within the text.]

Cooley DA. Reflections and Observations; Essays of Denton A. Cooley. Austin, TX: Eakin Press, 1984. [This book covers a wide spectrum of subjects pertaining to the life and surgical career of perhaps the world's most prolific cardiac surgeon. Written in a philosophical view, the text is essentially autobiographical, although topics such as heart transplantation and health care costs are debated. Except for a schematic of the author's early reusable bubble oxygenator (often referred to as the Cooley Coffee Pot), there is no mention of cardiopulmonary bypass whatsoever.]

Reed CC, Stafford TB. Cardiopulmonary Bypass (Second Edition). Houston: Texas Medical Press, 1985. [This is the curiously designated "second edition" of the book "Cardiopulmonary Perfusion" from 1975. It was authored by two clinical perfusionists involved in the training program at the Texas Heart Institute. It was expanded from the first edition to 500 pages and included developments in myocardial protection and use of hypothermic circulatory arrest for surgical correction of complex congenital defects and thoracic aneurysms. As in the first edition, it is liberally illustrated with figures on anatomy, surgical procedures, and, surprisingly, contemporary devices. Controversial subjects are addressed along with another new chapter on accidents and safeguards.]

Utley JR, Betleski R (Eds.) Perioperative Cardiac Dysfunction, Vol. III. Baltimore: Williams & Wilkins, 1985. [This monograph, with all chapters from physician contributors who had presented at two symposia organized by the senior editor, focused on clinical aspects of myocardial performance after cardiac surgery and perioperative factors affecting the patient's recovery. When such recovery does not go as expected, there are chapters on use of intra-aortic balloon pumps, temporary circulatory support, and ventricular assist devices.]

Taylor KM (Ed.) Cardiopulmonary Bypass; Principles and Management. London: Chapman & Hall, 1986. [From the Preface, "It is surely a sign of progress when attention in cardiac surgical practice turns from mortality to morbidity." The editor recruited notable contributors, mostly from the United Kingdom, to address all aspects of extracorporeal circulation including monitoring,

anesthesia, oxygenation, anticoagulation, myocardial protection, and adverse effects such as microemboli. The first chapter succinctly recounts the history of cardiopulmonary bypass (CPB) as developed by one of the early pioneers, Mr. Denis G. Melrose. The last chapter, written by a former perfusionist, D.R. Wheeldon, addresses safety during CPB with commonly reported complications and suggests ways to reduce risks.]

VanderVeer JB. Cardiology at the Pennsylvania Hospital 1920-1980. Bryn Mawr, PA: Dorrance & Company, Inc., 1986. [This monograph reports an early attempt at right heart bypass in 1952 by members of Dr. John Gibbon's staff to correct a suspected right atrial myxoma.]

Roberts AJ (Ed.). Myocardial Protection in Cardiac Surgery. New York: Marcel Dekker, 1987. [This monograph was based on a symposium held in May 1985 sponsored by Boston University Medical Center. The purpose was to present current state-of-the-art developments in myocardial protection, while acknowledging "the ideal cardioplegic solution has not yet been developed." Crystalloid and blood-based solutions, delivery methods, and patient outcomes from leading clinicians and researchers are reported. One chapter is first-authored by a perfusionist (T.D. Hankins) and describes perfusion-related factors influencing myocardial protection; it includes illustrations of various delivery configurations (e.g., non-recirculating, recirculating, and those with or without integral heat exchangers).]

Schroeder Family, Barnette M. The Bill Schroeder Story: An Artificial Heart Patient's Historic Ordeal and the Amazing Family Effort that Supported Him. New York: William Morrow and Co., 1987. [This is a chronicle of the longest-living recipient of a total artificial heart (620 days) and the trials and tribulations he and his family experienced.]

Severinghaus JW, Astrup PB. History of Blood Gas Analysis. International Anesthesiology Clinics, Vol. 25, No. 4, Winter 1987. [This wonderful monograph brings together two key figures to recount the history of how to measure acids, bases, and gases in blood. They originally published the results of their work in Danish in 1985. As a sidenote, Dr. Severinghaus began his research career at the National Institutes of Health in 1953 by studying the effects of hypothermia in patients and animals when used as an adjunct to cardiac surgery. This book explains everything about the Henderson-Hasselbalch equation, pCO_2 versus pH, base excess, the Clark electrode, temperature effects, and all the familiar parameters perfusionists deal with every day.]

Reed CC, Kurusz M, Lawrence EA Jr. Safety and Techniques in Perfusion. Stafford, TX: Quali-Med, 1988. [This book was written by three perfusionists who focused on adverse events during cardiopulmonary bypass and legal implications drawn from their personal experience or as reported in the literature. The first two chapters cover perfusionist duties and responsibilities and legal and risk management. Many chapters have circuit and device illustrations.]

Hilberman M (Ed.) Brain Injury and Protection during Heart Surgery. Boston: Martinus Nijhoff Publishing, 1988. [The Preface forthrightly states, "Brain injury is one of the most unacceptable complications sustained during heart surgery." Authors were chosen to present their current results and thoughts on how to define aspects of brain physiology, pathophysiology, and protection

during cardiopulmonary bypass (CPB). Historical results from one group in the early 1970s when using a disc oxygenator primed with blood, maintaining the patient's blood pressure no less than 70 mmHg, and CPB flows of 2.2 L/min/m^2 body surface area yielded a 30-day mortality of ~10%, but cerebral complications in ~20% of the patients. Another chapter lucidly addresses pCO_2 management and the recommendation not to "correct" blood gas results for temperature. Many chapters were written by cardiac anesthesiologists, but one was co-authored by clinical perfusionists (R.G. Berryessa, C.M. Tyndal, Jr.) who addressed equipment, checklists, and standards for the conduct of CPB.]

Tinker JH (Ed.) Cardiopulmonary Bypass; Current Concepts and Controversies. Philadelphia: WB Saunders, 1989. [This monograph arose from workshops held by the Society of Cardiovascular Anesthesiologists. What becomes evident is areas of non-agreement on controversial areas such as blood-gas management (alpha-stat v. pH-stat), reversal of heparin anticoagulation, and cardiopulmonary bypass blood flow. The editor acknowledges the book could serve as a stimulus for further research to resolve areas of concern expressed by the author experts.]

Compilation. Twenty-five Years of Excellence; A History of the Texas Heart Institute. Houston: Texas Heart Institute Foundation, 1989. [This hardback book extols the many accomplishments at the Texas Heart Institute (THI) and the scores of people who contributed to its world-renowned success. As expected, Dr. Denton Cooley is featured prominently in the text and photographs. Six pages are devoted to Perfusion Technology and have several historical drawings and photographs. There is a tribute and photograph of Charles C. Reed, who was chief of the Section of Perfusion Technology, director of the THI School of Perfusion Technology, and a major leader in perfusion organizations in the 1970s and 80s.]