Book Review

Mechanical Circulatory Support
Edited by Terence Lewis and Timothy R. Graham

Edward Arnold
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385 pages, 45 chapters
4 co-editors, 66 contributing authors

This book contains a wealth of up-to-date information relating to ventricular assistance. It is divided into eight sections: Introduction, Advanced Respiratory Support, Cardiopulmonary Bypass, Short and Medium Term Support, Long Term Support, Biological Assistance, Problems, and General Issues.

Ventricular assistance in the United States is generally categorized into post-cardiotomy support and bridge-to-transplantation applications. This textbook reviews the subject in its broadest sense which encompasses all forms of mechanical support including cardiopulmonary bypass and extracorporeal membrane oxygenation. In addition, the section on biological assistance includes reviews of cardiomyoplasty and xenotransplantation.

The information presented is useful to the practicing perfusionist because a number of the topics covered are perfusion practice based, such as centrifugal pumps, pulsatile blood flow, and blood-surface interaction. The chapters on the IVOX intravascular gas exchange device and ECMO (Chapters 7, 8, and 9) were especially well-written and comprehensive. Newer technologies such as the Hemopump are thoroughly presented, and their application to coronary bypass procedures as an alternative to cardiopulmonary bypass is extremely interesting.

The review of the various long term devices is well presented, although it is not always clear in the chapters on the physiological response to long term support (Chapters 2 and 18) which device was used. The only device that is not covered in detail is the Abiomed BVS5000, which along with the TCI Heartmate are the only devices approved by the FDA. This probably reflects a lack of experience in Great Britain with the Abiomed device by the editors. All of the other medium and long term devices discussed require an IDE (Investigational Device Exemption) in the U.S.

The historical significance of the Jarvik 7 total artificial heart and its evolution to its present-day counterpart as the CardioWest C-70 is completely reviewed. This includes successful support with the modified Jarvik 7 as a bridge to transplantation in large series of nearly 200 patients. It is interesting that this technology was almost abandoned after 30 years of development when funding was eliminated in 1990. The NHLB Institute spent $264 million between 1964 and 1989 on artificial heart research, a large portion of which funded the evolution of devices into development of the Jarvik 7.

Each proponent of a mechanical device claims that their results are excellent based on the alternative (death). This makes a prospective randomized study of these devices very difficult. Most institutions have experience with one device, therefore comparison of clinical results is very difficult due to institutional bias. The analysis of survival and complication rates in terms of their economic impact is accomplished in Chapter 45.

Parts of the book are redundant with two chapters on material-blood interface in Section I and a chapter on device linings in Section VII. There are also chapters on ECMO that appear in Sections II and VII. The chapters in the Problems Section could have been incorporated into other sections, as well as the final section devoted to Economic and Ethical Considerations. In addition to the review of the history of ventricular assist in the first chapter, each author reviews the history in their introduction. This repetition reflects the large number of authors, editors, and co-editors involved with the project.

Although the book is not directed towards perfusionists, it reviews many recent publications regarding this rapidly evolving technology. Perfusionists need to be aware of opportunities to expand their scope of practice, and be familiar with the devices that are becoming available. If it is true that some of these devices may be used as an alternative to cardiopulmonary bypass, then the perfusionist will want information necessary to operate these devices. This book accomplishes the task of providing the necessary reference information to become involved with any type of circulatory support.

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