

Temporary Cardiac Assist with an Axial Pump System

To Hilde, Sarah and Ine

W. Flameng (Ed.)

Temporary Cardiac Assist with an Axial Pump System



Springer-Verlag Berlin
Heidelberg GmbH



Editor:

Willem Flameng M.D.
Department of Cardiac Surgery
Katholieke Universiteit Leuven
B-3000 Leuven
Belgium

Cover illustration:

Study of Archimedes's screw-driven
water pump by Leonardo da Vinci,
ca. 1475–80.
Milan, Ambrosiana, Codex Atlanticus

Die Deutsche Bibliothek – CIP-Einheitsaufnahme

**Temporary cardiac assist with an axial pump system / W.
Flameng (ed.).**

ISBN 978-3-7985-0906-1 ISBN 978-3-662-10284-8 (eBook)

DOI 10.1007/978-3-662-10284-8

NE: Flameng, Willem [Hrsg.]

This work is subject to copyright. All rights are reserved whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitations, broadcasting, reproduction on microfilms or in other ways, and storage in data banks. Duplication of this publication or parts thereof is only permitted under the provision of the German Copyright Law of September 9, 1965, in its version of June 24, 1985, and a copyright fee must always be paid. Violations fall under the prosecution act of the German Copyright Law.

Copyright © 1991 by Springer-Verlag Berlin Heidelberg

Originally published by Dr. Dietrich Steinkopff Verlag GmbH & Co. KG, Darmstadt in 1991

Medical Editorial: Sabine Müller – English Editor: James C. Willis – Production: Heinz J. Schäfer

The use of registered names, trademarks, etc., in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Type-setting,
Printed on acid-free paper

Preface

With this book, it was not our intention to provide a complete “textbook” on axial pumps and their use as temporary cardiac assist systems. It is more a sharing of experiences with a novel left-ventricular assist system, the Hemopump, as it was developed by R. K. Wampler. This device, marketed by Johnson & Johnson Interventional Systems, has not yet been widely used and accepted in clinical practice. It was offered to us some time ago to study its applicability in the experimental setting. At the moment, it is under investigation in many centers and it is commercially available. However, as with any other cardiac assist system, the axial pump has its own advantages and limitations. Needless to say, critical analysis of such a novel device is mandatory and, therefore, we are grateful to our colleagues who were willing to contribute to this book. They present, discuss, and analyze their experimental and clinical experience with the Hemopump and focus on side-effects, deficiency and efficiency of this device which, by virtue of its simplicity is revolutionary.

Leuven, Belgium, 1991

Willem Flameng

Contributors

H. Reul, Ph.D.

Helmholtz Institute for Biomedical Engineering at the RWTH Aachen, Pauwelstrasse 30,
D-5100 Aachen, FRG

R.K. Wampler, M.D.

Nimbus Medical, Inc., 2890 Kilgore Road, Rancho Cordova, California 95670, USA

K.-H. Scholz, M.D.

Kliniken der Universität Göttingen, Fachbereich Medizin, Zentrum Innere Medizin
Abt. Kardiologie, Robert Kochstrasse 40, D-3400 Göttingen, FRG

P. Wouters, M.D.

University Clinic Gasthuisberg, Department of Anesthesiology, Herestraat 49,
B-3000 Leuven, Belgium

O.H. Frazier, M.D.

Texas Heart Institute, 1101 Bates Avenue, Suite P-306, Houston, Texas 77030, USA

U. Mees, M.D.

University Clinic Gasthuisberg, Department of Cardiac Surgery, Herestraat 49,
B-3000 Leuven, Belgium

O. Jegaden, M.D.

Hôpital Vasculaire Louis Pradel, 59 Boulevard Pinel, F-69003 Lyon, France

D. Loisance, Ph.D., M.D.

Centre Hospitalier Henri Mondor, Faculté de Médecine, 8 Rue du Général Sarail,
F-94010 Créteil Cedex, France

W. Flameng, Ph.D., M.D.

University Clinic Gasthuisberg, Department of Cardiac Surgery, Herestraat 49,
B-3000 Leuven, Belgium

Contents

Preface	V
Contributors	VI

I. Basic Aspects

Hydromechanical principles of axial pumps H. Reul (Aachen, FRG)	3
The first co-axial flow pump for human use: the Hemopump R.K. Wampler (Sacramento, California, USA)	11
Effect of the Hemopump in cardiogenic shock and in the early stage of regional myocardial ischemia K.H. Scholz (Göttingen, FRG)	17
Effects of left ventricular assist using a co-axial flow pump (Hemopump) on organ blood flow during experimental cardiogenic shock P. Wouters (Leuven, Belgium)	27

II. Clinical Aspects

Investigational trials of the Hemopump R.K. Wampler (Sacramento, California, USA)	39
Investigational trials of the Hemopump at the Texas Heart Institute: practical issues O.H. Frazier (Houston, Texas USA)	47
Success and failure of the Hemopump: a critical analysis U. Mees (Leuven, Belgium)	51
Clinical results of Hemopump support in surgical cases O. Jegaden (Lyon, France)	61
Hemopump for supported angioplasty. J.L. Dubois-Rande (Créteil, France)	67
Indications for the use of the Hemopump W. Flameng (Leuven, Belgium)	73