Peripheral Vascular Diseases

AN OBJECTIVE APPROACH

By

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With a Foreword by

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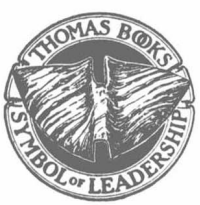

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Peripheral Vascular Diseases

Rudolph Matas, 1860–1957

Rudolph Matas was the first to use spinal anesthesia clinically. In 1902, he devised a "radical" operation for aneurysm, "aneurysmorrhaphy" which was the first advance in this type of surgery since the days of John Hunter. He was an able teacher, a clear and original thinker and tireless investigator. He maintained an active interest in his work up to a few years prior to his death at 97 years of age. He was the first to close an arteriovenous fistula between the carotid artery and the jugular vein (1912). In his Bigelow address in 1927 he summarized the qualities that make a great surgeon, and in this summary he reflected his own image, "The surgeon must be original. He must be endowed with the spirit of invention; he must possess a faculty for investigation, or that spontaneous intuition which leads a man to seek untrodden paths and discover new truths, new methods, new procedures or forge new and unknown weapons to battle with disease or stay the hand of death."

"Nature is written in mathematical symbols." GALILEO, 1564–1642

It is
with grateful appreciation
that this book is dedicated
to my family

Betty, David, Susan
Wiley and Mabel

Foreword

DURING a considerable period of years, it has been my privilege and pleasure to observe the work of DR. TRAVIS WINSOR as a teacher, clinical and experimental investigator, as well as an active practitioner.

In addition to his teaching program in the School of Medicine at the University of Southern California, he continued to pursue investigations of the peripheral vascular system, which attracted the cooperation, assistance, and support of numerous individuals, both laymen and professional.

The techniques used in this work ranged from the most simple, but wise and accurate observations, to the use of the most complicated instruments available for such studies today.

Through these efforts, there has been an accumulation of knowledge that constitutes the background of this book. The interpretations of findings, as well as the methods of diagnosis and treatment are of great value and inspiration to students, teachers, investigators and practitioners who are especially interested in the peripheral vascular system, and its related conditions.

The great efforts and time expended in the preparation of the manuscript and illustrations are justified in its presentation to the entire scientific medical world.

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Preface

RAPID advances in the understanding, diagnosis and treatment of abnormalities of the peripheral circulation have occurred during the past decade during which a new era has been entered, that of electronic instrumentation. The development of instruments which provide objective measurements to augment and, in some cases, to take the place of previous subjective observations has given great impetus to the study of the circulation of blood through the extremities.

Five great eras can be recognized in the development of our knowledge of the peripheral circulation. These are the eras of: (1) observation of the living; (2) dissection of the dead; (3) physiologic investigation; (4) application of optics, mathematics and physics, and (5) application of electronics. The first era began with Hippocrates, 460 B.C. to 377 B.C., who recognized and described gangrene and the effects of other peripheral vascular diseases. The second era began at the time of Leonardo De Vinci, 1452 to 1515, who noticed while dissecting that the arteries of the young were elastic and straight and those of the old were thick, rigid and tortuous. The third era began with William Harvey, 1578 to 1657, who established the scientific method for physiologic investigation and showed that blood circulated in a closed system of vessels. The fourth era occurred at the time of Antony van Leeuwenhoek, 1632 to 1723, and J. L. Poiseuille, 1799 to 1869, with the development of optics, mathematics and physics. Van Leeuwenhoek was the first to use the microscope for the systematic study of the blood vessels. Poiseuille used mathematics to describe the factors which control the flow of blood in vessels. The fifth era is that of electronics which began with the development of the vacuum tube by DeForest and is continuing to grow and expand with more and greater advances yearly.

These developments have made possible numerous instruments for the objective measurements of the peripheral circulation.

The purpose of this monograph is to present through these improved instruments an objective approach to the understanding and treatment of patients with peripheral vascular disease. This must start with a knowledge of the functional anatomy of the human circulation and nervous system and an understanding of the way in which the various organs of the body affect blood flow. Important aspects of the physical examination of the vascular system are considered in the light of various objective studies with emphasis placed on the plethysmographic examination which is a practical and informative laboratory examination and making possible objective observations of the peripheral circulation not obtainable in various other studies. The information gained from these studies is important in understanding disease, determining treatment and making comparisons of various pharmacologic agents, physical therapeutic and surgical procedures.

The various therapeutic measures employed in the field of peripheral vascular disease which have been found useful by the author are discussed in detail. Great advances have been made in the surgical treatment of peripheral vascular diseases in the form of thromboendarterectomy, arterial grafts and reconstructive surgery. Advanced instrumentation has made it possible for the internist and surgeon to advance together.

In the writing of this manuscript the immeasurable help which has been received from numerous friends is gratefully acknowledged.

Sincere appreciation is expressed to the Los Angeles County and Ventura County Heart Associations which supported many of the original studies presented. Especially important is the outstanding help of Lewis T. Bullock, M.D., Chairman of the Research Committee of the Los Angeles County Heart Association, who forcefully has shown the need for original investigation in the West and whose continued efforts have made possible funds and facilities for our own work and for the work of innumerable other investigators. From his initial ideas and efforts there has grown an ever enlarging research effort in this area. The generous help of Charles Hufnagle, M.D. made possible the establishment

of the Los Angeles County Heart Association Artery Bank which is described.

The encouragement initially provided by B. O. Raulston, M.D., Dean Emeritus of the University of Southern California, and the long, stimulating and pleasant association with George E. Burch, M.D., Professor of Medicine, Tulane University, New Orleans, Louisiana, have been important factors in the continuance of the studies reported in this monograph. Many of these studies were carried out with facilities provided by the Hospital of the Good Samaritan, Los Angeles and the cooperation of the Hospital Administration is gratefully acknowledged. The exchange of ideas and the stimulating discussions held frequently with Chester Hyman, Ph.D., Professor of Physiology, University of Southern California School of Medicine have been especially rewarding and have been a source of renewed enthusiasm. Wilbur A. Selle, M.D., Professor of Biophysics, University of California at Los Angeles, School of Medicine, assisted in getting this manuscript underway. Invaluable mathematical assistance was provided through E. K. Fisher of Lockheed Aircraft Missile Systems Division. J. Howard Payne, M.D., provided aortograms and performed many of the surgical procedures. Harold Karpman, M.D., National Heart Institute Trainee and Thomas Berne, Heart Research Fellow have given valued editorial and technical assistance.

The art work was executed by Gregg Moris and Alan Cole whose abilities have transformed many an ordinary sketchy outline into an attractive illustration. Manuel Gonzales assisted with these illustrations. The most continuous work of the book, the typing and retyping of the manuscript, has been done primarily by my most capable secretary, Mrs. Sally Cody. She has had the assistance of Miss Doris Wade.

It is hoped that this book will give a fresh approach to the study of peripheral vascular disease and will stimulate a closer association between basic scientists and physicians from which will evolve new and better instruments for the objective measurements of the peripheral circulation.

T.W.

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