

Modern Vascular Surgery

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Edited by

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Modern Vascular Surgery

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DEDICATION

This book is dedicated to my sons

Victor and Robert

I love and cherish you, Victor and Robert. I am very proud to be the father of two intelligent, loving and handsome young men. You give to our lives, more than nature gives of springtime, beauty and love.

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Some of the young investigators' papers are included in this book. These may not be the same as the papers written by our outstanding faculty; however, I strongly believe that they are the men and women who are the future of our profession. They will be the "teachers" for their younger generation. I strongly encourage them and cherish their work.

My sincere thanks to the Long Island Jewish Medical Center, Robert K. March, M.D., President and Leslie Wise, M.D., Chairman, Department of Surgery for their continued support and trust extended to me through the years.

My sincere thanks to Dr. Seymour Cohen, V.P. for Education, Mr. Anne Hochman, the convention coordinator, Ms. Deborah Mahr, and the staff of the Office for Continuing Education, Long Island Jewish Medical Center for their outstanding contribution to this symposium.

Preface

In May 1987, over 500 distinguished surgeons, physicians and scholars were in attendance at the New York Hilton Hotel, New York City, for the Third International Symposium - Vascular Surgery 1987, the State-of-the Art. This book is based, mainly, on the presentations given by an outstanding international group of scholars.

Vascular surgery is now a recognized field of specialized surgery, with board certification. As Dr. Michael E. DeBakey eloquently presented at his special lecture, The History of Vascular Surgery and Its Future, "...vascular surgery has come a long way." Because of the many outstanding scholars and clinicians who have contributed and shared their knowledge, today we enjoy an ever growing field of medicine. We have accomplished so much; yet the goal is endless.

I deeply appreciate Dr. Michael E. DeBakey's support on behalf of the convention and his kind remarks. There were many good old friends and many new friends present. I appreciate their support.

Dr. Anthony M. Imparato, Dr. Larry H. Hollier, Dr. Julius H. Jacobson and Dr. Malcolm O. Perry, again, gave their support to the Third International Vascular Symposium. Their strong friendship from the inception of our First International Vascular Symposium in 1983 to the present is deeply appreciated.

I also wish to thank Mr. H.H.G. Eastcott, Dr. John E. Connolly, Dr. James A. DeWeese and Dr. K. Wayne Johnston and all the faculty of the First, Second and Third International Vascular Symposiums for their support and friendship.

During this symposium, I also initiated an award of prizes for scientific papers from young doctors and medical students. Nine young investigators from Europe, the Far East and the United States were awarded prizes. It is our duty to maintain the highest standards of medicine and to maintain the integrity of our profession.

Some of the young investigators' papers are included in this book. These may not be the same as the papers written by our outstanding faculty; however, I strongly believe that they are the men and women who are the future of our profession. They will be the "Teachers" for *their* younger generation. I strongly encourage them and cherish their work.

My sincere thanks to the Long Island Jewish Medical Center, Robert K. Match, M.D., President and Leslie Wise, M.D., Chairman, Department of Surgery for their continued support and trust extended to me through the years.

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I also thank my staff of the Long Island Vascular Center for their continuing support and love.

My special thanks to Ms. Eileen Moran Zanini, who has worked with me for many years and continues to do a wonderful job. I especially thank Eileen for her outstanding work and her editorial skills throughout the years and especially for the convention that lead to this book.

My sincere appreciation and love always to my lifetime friend, Lucy Chang, M.D., my wife. Her endless support and understanding have made my life more meaningful than words can express.

Once again, my sincere gratitude goes to my house staff members, medical students, and my patients, for their mutual trust and respect.

At last, my love and appreciation to my two sons, Victor and Robert for being good and understanding children while growing up. I missed many of their baseball games, football games and other functions; this is one regret that I will never be able to overcome. I hope that my sons, Victor and Robert know that I love them very dearly and that I am very proud they are my sons and proud of all their accomplishments.

John B. Chang, M.D., F.A.C.S.

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**Prize-Winning Paper*

Hemodynamic Evaluation of Extremity Arterial Disease

Richard F. Kempczinski

INTRODUCTION

During the 30 years which have elapsed since Satomura first described the flow patterns in peripheral arteries using ultrasound, hemodynamic evaluation has become an important tool in the assessment of patients with arterial occlusive disease; and vascular diagnostic laboratories capable of providing such data have sprung up in most hospitals around the country. However, technology has often outpaced appropriate clinical application, and abuse and overutilization have raised serious questions regarding the cost effectiveness and value of such studies [1].

Although an experienced examiner can detect the presence of extremity arterial occlusion in most patients, clinical examination alone may be misleading in certain situations: eg, when there is concomitant neuropathy [2]. Furthermore, since many patients with lower extremity pain are initially seen by clinicians who may be inexperienced in managing vascular disease, the noninvasive laboratory can objectively confirm their diagnosis and ensure prompt and appropriate triage of such patients. In much the same way that repetitive measurement of brachial blood pressure has become invaluable in the medical management of hypertension, determination of lower extremity systolic pressures provides objective documentation of the regional hypotension that is the hallmark of arterial occlusive disease.

Apart from the mere documentation of arterial occlusive disease, noninvasive testing is useful in relating an anatomical lesion to its resulting functional derangement. This is especially important in diabetics where hemodynamic data are critical in categorizing the severity of resting extremity symptoms. It may also be valuable when there are multiple, serial arterial occlusions whose relative hemodynamic significance must be gauged in order to plan appropriate surgical reconstruction.

Such tests may also be useful in guiding subsequent angiography. If the radiologist knows, in advance, the location of hemodynamically significant lesions, he can alter his approach to ensure visualization of the areas of clinical interest. On the other

hand, if hemodynamic testing fails to demonstrate a lesion consistent with the patient's symptoms, unnecessary angiograms may be avoided [3].

Furthermore, since distal pulses may be absent even after a successful proximal reconstruction, and incisional pain or coexistent neuropathy may raise concerns regarding continued graft function, the need for hemodynamic parameters is especially important in the perioperative assessment of patients. Postoperative patients can also be followed more carefully in the vascular laboratory than is possible by clinical examination alone. The results of nonoperative therapy can thus be objectively documented and potential disease progression detected even before the patient appreciates clinical deterioration.

In this chapter, we will describe those techniques which currently hold an established place in the hemodynamic evaluation of extremity arterial occlusive disease. Although there have been few dramatic advances in this area comparable to those recently seen in cerebrovascular diagnosis, we will examine some of the newer, more promising approaches which could potentially extend our diagnostic capabilities, and we will try to place their use in proper clinical perspective.

TEST PROCEDURES

Although there is no consensus regarding which procedures are most appropriate for the evaluation of extremity arterial insufficiency, a few generalizations appear warranted. A combination of tests is usually more sensitive than any single test. Therefore, most laboratories generally use at least two of the procedures described below. Because chronic arterial occlusions may be very well compensated under resting conditions, persons with exercise-related complaints must usually undergo some form of stress testing or reactive hyperemia to document and accurately measure the extent of their disability.

Table 1.1. Noninvasive techniques for the evaluation of extremity arterial disease

INDIRECT TESTS	
Segmental systolic pressures/indices	
Stress testing	
Doppler velocity waveforms	
Segmental pulse volume plethysmography	
Transcutaneous pO ₂ or pCO ₂ measurement	
DIRECT TESTS	
Doppler arterial survey	
Doppler spectral analysis	
Ultrasonic imaging	
Duplex scanning	