# ADVANCES IN

## Vascular Surgery

**VOLUME 1** 

## Editor-in Chief Anthony D. Whittemore, M.D.

Associate Professor Surgery, Harvard University Medical School; Chief, Division of Vascular Surgery, Brigham and Women's Hospital, Boston, Massachusetts

## **Associate Editors**

## Dennis F. Bandyk, M.D.

Professor of Surgery, University of South Florida College of Medicine; Director, Vascular Surgery Division, Chief of Vascular Surgery, Tampa General Hospital, Tampa, Florida

#### Jack L. Cronenwett, M.D.

Professor of Surgery, Dartmouth College, Mary Hitchcock Medical Center, Hanover, New Hampshire

### Norman R. Hertzer, M.D.

Chairman, Department of Vascular Surgery, Cleveland Clinic Foundation, Cleveland, Ohio

### Rodney A. White, M.D.

Professor of Surgery, University of California at Los Angeles School of Medicine; Chief of Vascular Surgery, Harbor—University of California at Los Angeles Medical Center, Los Angeles, California



St. Louis Baltimore Boston Chicago London Madrid Philadelphia Sydney Toronto

MEDTRONIC 1113





Sponsoring Editor: Linda M. Steiner Project Manager: Denise Dungey Project Supervisor: Maria Nevinger Production Editor: Laura Pelehach

Staff Support Administrator: Barbara M. Kelly

Copyright © 1993 by Mosby-Year Book, Inc.

Mosby-Year Book, Inc. 11830 Westline Industrial Drive St. Louis, MO 63146

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Printed in the United States of America.

Permission to photocopy or reproduce solely for internal or personal use is permitted for libraries or other users registered with the Copyright Clearance Center, provided that the base fee of \$4.00 per chapter plus \$.10 per page is paid directly to the Copyright Clearance Center, 21 Congress Street, Salem, MA 01970. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collected works, or for resale.

Editorial Office: Mosby—Year Book, Inc. 200 North LaSalle St. Chicago, IL 60601

International Standard Serial Number: 1069-7292 International Standard Book Number: 0-8151-9405-6



## Contents

	Contributors	٧
	Preface	vi
PART I.	Carotid Artery Disease	
	Historical Perspective of Carotid Artery Disease. By Jesse E. Thompson	3
	Symptomatic Carotid Artery Disease	3 7
	By D. Eugene Standness, Jr.	17
	Prospective Studies	19
	Trial Design	20
	Outcome	20
	Discussion	21
	Treatment of Asymptomatic Carotid Stenosis.	0.5
	By Robert W. Hobson II	25
	Defining Terminology	26
	Surgical Considerations	27
	Clinical Trials	29
	Current Recommendations	35
	Diagnostic Evaluation of Carotid Artery Disease.	
	By R. Eugene Zierler	39
	Noninvasive Diagnostic Methods	39
	Indirect Tests Direct Tests	39 41
	Radiologic Diagnostic Methods	47
	Conventional Contrast Arteriography	47
	Computerized Cerebral Tomography	48
	Magnetic Resonance Angiography	48
	Clinical Applications	50
PART II.	Aortic Disease	59
	<b>Retroperitoneal Approach for Aortic Reconstruction.</b> By Calvin B. Ernst and Alexander D. Shepard	61
	Advantages and Disadvantages	62
	Indications and Contraindications	62



#### x Contents

Preoperative Evaluation

Operative Technique

Positioning

Incision

Aortic Exposure

Distal Exposure

Aortic Clamp Placement

Wound Closure

Results

Summary

## Reducing the Risk of Spinal Cord Injury During Thoracoabdominal Aortic Aneurysm Repair.

By Thomas C. Naslund and Larry H. Hollier

Spinal Cord Blood Supply

Pathophysiology of Ischemic Spinal Cord Injury

Clinical Manifestations of Spinal Cord Ischemia

Spinal Cord Protection During Operation

Postoperative Care

Clinical Results

Summary

## PART III. Endovascular Techniques

## Endovascular Repair of Abdominal Aortic Aneurysms.

By Juan C. Parodi

Laboratory Experience

Clinical Experience

Device Components

Preprocedural Evaluation

Procedural Technique

Patient Selection

Complications

Late Results

**Technical Considerations** 

Arterial Access

Distal Graft Deployment

Patent Branch Vessels

Secondary Endovascular Procedures

Miscellaneous Complications

The Future of Endovascular Grafting

## Intravascular Stents.

By Julio C. Palmaz, Frank J. Rivera, and Carlos Encarnacion

Mechanical Considerations

Hemodynamic Considerations



	Conte	ents	xi
	Anticoagulation and Stent Thrombogenicity		113
	Relationship Between Slow Flow and Intimal Hyperplasia		114
	Coated Stents		114
	Intraluminal Bypass		115
	Current Clinical Experience With Intravascular Stents		116 116
	lliac Arteries Femoropopliteal Arteries		121
	Renal Arteries		124
	Large Veins		125 126
	Transjugular, Intrahepatic, Portosystemic Stent Shunt		120
	Intraluminal Ultrasound and the Management		
	of Peripheral Vascular Disease.  By Douglas M. Cavaye and Rodney A. White		137
	Intraluminal Ultrasound Imaging Devices		137
	Intravascular, Cross-Sectional Imaging		139
	Three-Dimensional Computerized Image Reconstruction		140 141
	Forward-Looking Intraluminal Ultrasound Intraluminal Ultrasound Imaging Techniques		141
	Vascular Access		141
	Optimizing Image Quality		143
	Image Interpretation		144
	Clinical Applications of Intraluminal Ultrasound Diagnostic Uses		144 144
	Therapeutic Uses		149
	Current Limitations and Future Directions		156
	The Role of Angioscopy in Infrainguinal Arterial		
	Reconstructions.		159
	By William H. Pearce, Kevin D. Nolan, and James S.T. Yao History		159
ı	Equipment		160
	Angioscopy-Assisted in Situ Bypass		160
	Technique		162
	Angioscopically Assisted Thromboembolectomy		163
	Technique		164
	Angioscopy as a Technique to Detect Technical Errors		166
	Comments		167
PART IV.	Renal Artery Disease		169
	Changing Concepts in Indications for Renal Artery Reconstruction.	7	
	By Richard H. Dean		171
	Current Concepts in Diagnostic Studies		172
	Current Indications for Intervention		174



# DOCKET

# Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## **Real-Time Litigation Alerts**



Keep your litigation team up-to-date with **real-time** alerts and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## **Advanced Docket Research**



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## **Analytics At Your Fingertips**



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

#### **LAW FIRMS**

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

#### **FINANCIAL INSTITUTIONS**

Litigation and bankruptcy checks for companies and debtors.

## **E-DISCOVERY AND LEGAL VENDORS**

Sync your system to PACER to automate legal marketing.

