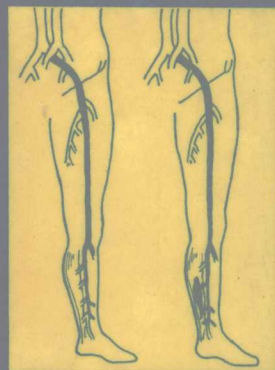
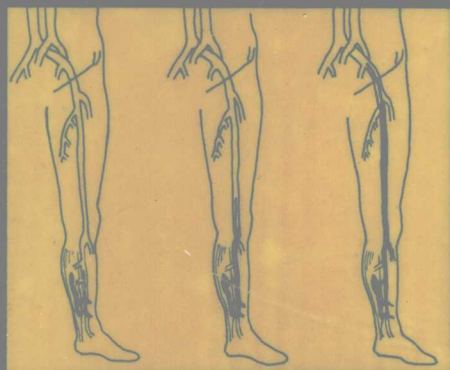


Harold Dodd  
Frank B. Cockett

Second Edition

# The Pathology and Surgery of the Veins of the Lower Limb



Churchill Livingstone

# THE PATHOLOGY AND SURGERY OF THE VEINS<sup>57-6</sup> OF THE LOWER LIMB

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THE PATHOLOGY AND SURGERY OF THE  
VEINS OF THE LOWER LIMB

TO OUR WIVES



\*Plaster Dermatitis—see page 70.

# Foreword

It is a pleasure and an honor I deeply appreciate to be asked to write the foreword for the new edition of *The Pathology and Surgery of the Veins of the Lower Limb*, now twenty years since I did it for the first edition. It was a landmark in bringing to the attention of the medical profession a most excellent and comprehensive book dealing with this branch of vascular surgery, something that had never before been so well accomplished. The new edition now carries on in the same excellent manner bringing the subject up to date.

This new edition opens with an interesting historical resume of anatomists, physiologists, physicians and surgeons who have contributed much in the past and the present to give a better understanding of the diseased condition of the veins of the lower extremity, and describes some of the more important methods of treatment.

Without question a better understanding of the surgical anatomy, applied physiology and the pathologic conditions, that is given by the authors has resulted in great advances in the treatment of venous diseases of the lower extremity. The newer methods are brought up to date for the diagnosis of thromboembolic disease including the use of I<sup>125</sup>, ultrasound with the transcutaneous Doppler unit, and angiography of the leg veins and the pulmonary arteries.

Emphasis is expressed again regarding the importance of a thorough knowledge of the etiology, the physiology, and the surgical anatomy of these blood vessels. In addition the effect of these blood vessels in the diseased state is discussed from simple varicose veins to the more complicated thromboembolic and post-thrombotic states of the lower limb. This enables one to understand the rationale of the various forms of treatment of the diseases of these blood vessels, which in my opinion is not comprehended even today much better than it was almost two centuries ago by the great majority of physicians and surgeons.

The methods of treating the most serious condition, thromboembolic disease, are well documented. Of special interest, also, are the prophylaxis and the therapy of the different types of iliofemoral and deep venous thrombosis, and the post-thrombotic changes in the lower extremities. An excellent discussion is also given of the congenital venous anomalies. The subject of simple varicose veins is discussed with the recommendation that the best form of treatment is the surgical removal of these blood vessels, and in addition the interruption of the incompetent communicating or perforating veins.

As in the previous edition great emphasis is placed on the late changes that develop in the skin and subcutaneous tissues in the 'gaiter' area of the ankle because of the decompensation of the lower leg venous pump due to incompetence of the communicating or perforating veins in this region, both on the internal and the external aspects of the ankle. The authors emphasize the important role that they play in the etiology of the chronic venous ulcers of the distal third of the lower extremity. They stress that the interruption of these veins is the most important surgical procedure that will help in obtaining a cure of these distressing and disabling problems of the veins of the lower

extremity. Considerable emphasis is also placed on the new 'Cockett' syndrome with reference to the etiology and the treatment of this condition with its lower limb complications and sequelae.

Without question it is my recommendation that those who are interested in the etiology and treatment of these very common types of peripheral vascular diseases, namely those that involve the veins of the lower limbs, should carefully read this excellent book with much benefit.

Boston, Mass. 1976

R. R. Linton

# Preface

It is twenty years since the first edition of this book appeared. During this period there has been such a rapid increase in our knowledge of all aspects of venous disease, that we have had to rewrite it almost completely.

Much of the old material has been pruned and shortened and several new chapters have appeared, particularly on physiology and congenital malformations, the newer diagnostic methods, and the more recent work on thrombo-embolism and its management.

As before, we have written with the practical aspects of the subject in mind. No finer training ground for surgery is to be found than in dealing with venous conditions. The diagnosis of the exact venous fault needs clinical skill and thoroughness. The operative procedures, though often considered trivial, are actually a testing exercise in exact dissection and good surgical technique, which when mastered largely overcome the difficulties of more extensive operations. The after care of the patient is of great interest and importance. It is therefore for the young trainee surgeon that we hope this book will hold a special message. However, the manifestations of diseases of the veins, especially the deep veins, are seen and have to be treated by every sort of doctor from general practitioner to dermatologist or consulting physician, and in the sections on thrombosis, embolism, and ulceration of the leg, its diagnosis and treatment, we hope that they also will find matter of interest.

Since the last edition, an immense amount of literature on venous problems has blossomed. It is difficult for the average surgeon to evaluate this, and find his way through many conflicting papers and reports to a sensible system of management of a patient. We have specially tried to provide guidance here, summarising the results of research and setting out practical régimes of management, based on this. Adequate references have been provided to give those interested a 'lead' to the relevant recent literature.

Particular care has been taken with the section on venous anatomy as this subject receives scant attention elsewhere. It is not possible to operate on varicose veins, or to understand thrombosis and the post-thrombotic syndrome, without precise anatomical knowledge.

It is a pleasure to express our appreciation for the generous assistance of our friends and colleagues—particularly those who have contributed special new sections of the book and whose names appear on the contributors' page. One of us (F. B. Cockett) has had the stimulating experience of working for many years in close contact with Professor Henry Barcroft, Professor J. B. Kinmonth, Professor Norman Browse and Dr Michael Lea Thomas. The experience, help and encouragement of these colleagues, who have between them contributed so much to the understanding of vascular problems over the years, is gratefully acknowledged. Bob Linton has once again, after twenty years, contributed our foreword, so marking our long and fruitful association with him which started in 1954.

We must also thank Mrs Monica Fain for deciphering our handwriting and repeated

typing of the manuscript. Similar appreciation is due to Major W. G. Leaper, M.V.O.

Finally, we must thank the staff of our publishers for their patience and co-operation in overcoming many production difficulties.

We acknowledge the gracious permission of Her Majesty the Queen to photograph the Leonardo da Vinci originals in the Royal Collection at Windsor Castle.

London, 1976

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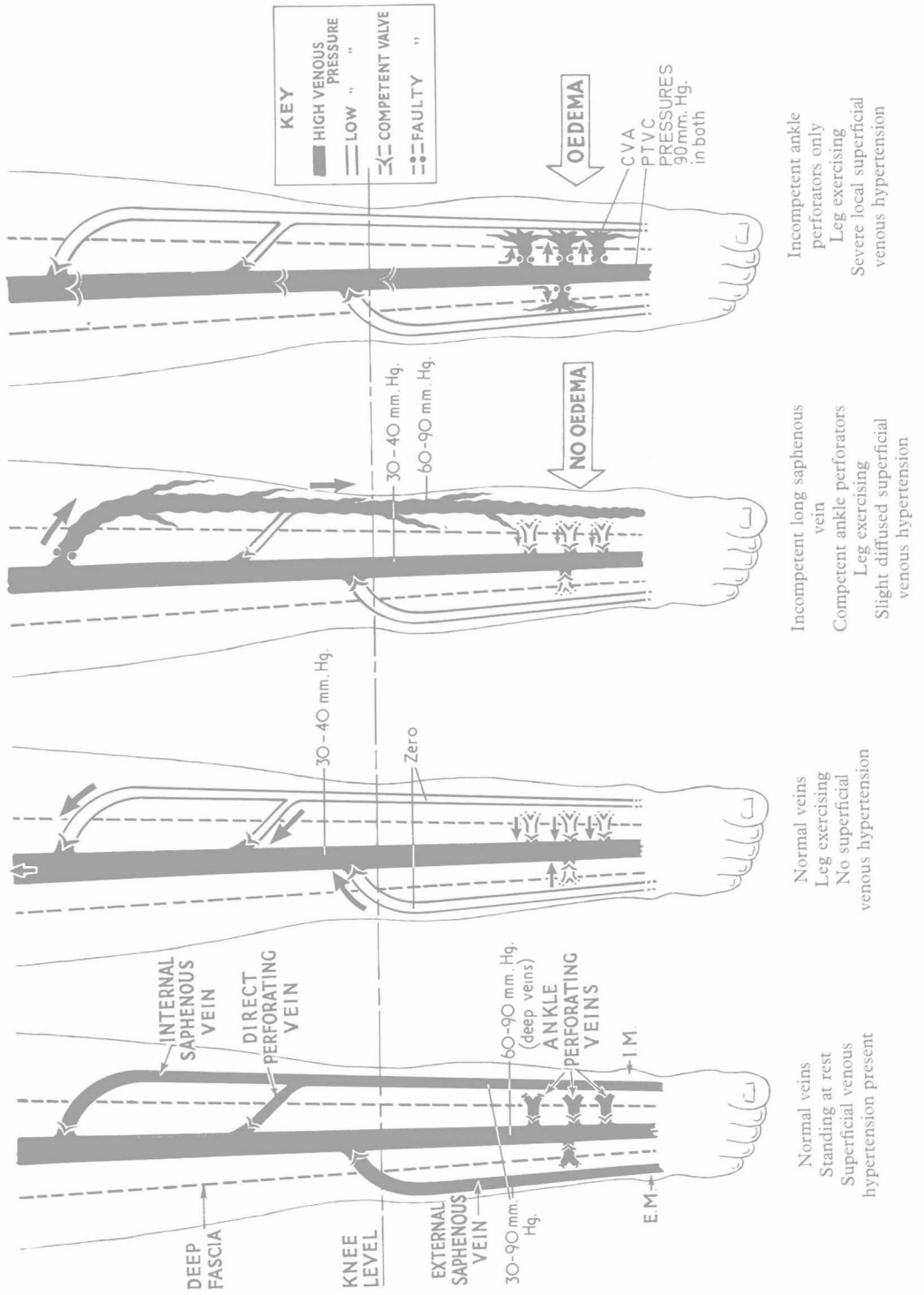
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**Part I**  
**History, Anatomy and Physiology**

Fig. 1.1 Superficial venous pressures at rest and at exercise in the erect position.



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# 1. Introduction

Varicose veins are one of the commonest ailments of Western peoples; probably one in five women and one in fifteen men over the age of forty-five have them. Gunnar Bauer (1950) says, 'It has been estimated that there are ten times as many sufferers from chronic venous disease of the lower extremities as from arterial disease with leg symptoms.'

Varicose veins are so numerous that only by every general surgeon having special knowledge and training in them and their associated complications, and accepting his share of their care, can the community's need in this respect be met. The reward is prompt, much lasting comfort is bestowed on individuals and their families, often working efficiency is restored. The operations for varicose veins are exacting, but the technical skill acquired is valuable in more major procedures.

We would say that every 'bad' leg can be materially improved by systematic diagnosis and planned treatment.

The actual finite cause of varicose veins is still unknown, but the more exact knowledge of the anatomy of the venous system of the leg, and the physiological mechanism whereby venous blood returns to the heart against gravity has provided clearer understanding of the pathology and of the disorders that medical men are called upon to treat.

## **Venous valvular failure and superficial venous hypertension**

Perhaps the most important of these studies has been on the behaviour of the venous pressure of the superficial and deep veins of the lower limbs in the erect position during rest and exercise and on the function of the

muscular venous pump. They have brought forth a clear and simple concept of the basic physiological mechanism at fault in varicose veins (Fig. 1.1).

The fundamental fact to grasp is that the venous drainage of the superficial tissues in the erect exercising leg is inwards to the deep veins via the various perforating or communicating veins. While exercising, the pressure in the main deep venous trunks is high, but the pressure in normal superficial veins gradually falls to nearly zero. In other words the blood in the superficial veins is sucked inwards to the deep veins of the limb during muscular movement and from these it is squeezed up towards the heart. What prevents this high pressure in the deep veins from being transmitted to the superficial veins during exercise? The answer is that at every point where a superficial vein joins a deep vein (great saphenous, small saphenous and all the communicating or perforating veins) there is a valve which prevents the reflux of blood from the deep to the superficial system. These valves prevent the hypertension in the deep veins from being transmitted to the superficial veins.

The primary cause of the development of the varicosis in the superficial veins lies in the destruction of the strategic valves in the perforating veins. This allows the normal high venous pressure developing within the musculofascial sheath during muscular activity to pass out and be exerted on the poorly supported superficial veins, resulting in an ambulatory venous hypertension in the affected group of superficial veins. This sustained venous hypertension in the superficial veins during movement and standing

results in their gradual stretching, enlargement, and tortuosity; a process which goes on steadily over the years, until the original valvular leak is found and stopped by surgery. In fact the surgical aim in venous defects and their complications is *to diagnose the site of the high pressure 'leak' from the deep veins into the superficial veins and to close it by ligation at its source.*

### **The comparative degree of superficial venous hypertension**

There is one further fundamental point. The ambulatory venous pressure which is transmitted outwards by a leak high in the limb, as at the saphenofemoral junction, is less than that which is transmitted out by a faulty perforating vein at the ankle level. Further, the leak at the saphenofemoral junction is into a large vein, the internal saphenous, with its numerous and considerable tributaries which can 'disseminate' the pressure readily and widely. The leak at the lower leg level, by the ankle perforating veins, is by a short wide vein or veins which drain fairly directly into an adjacent capillary bed. Hence for these reasons the effect of a pressure leak at the ankle level is likely to be more destructive than one from higher in the limb. This concept is of great importance in understanding the pathology of ankle ulceration.

### **The cause of venous valvular failure**

Thrombosis is an important and probably the most common cause of valve destruction in the perforating veins in the lower part of

the limb. But we are still uncertain what exactly causes the highest saphenous valve to become incompetent or destroyed in an early case of great saphenous incompetence.

Heredity undoubtedly plays a great part in the genesis of varicose veins. Whether a particular anatomical arrangement of valves, which predisposes to the throwing of great strain on the highest saphenous valve is inherited, or whether it is an actual weakness of the vein wall, it is impossible to say. Both factors probably play a part.

### **Definition**

A varicose vein is one which has permanently lost its valvular efficiency. Venous distension and dilation, especially in the erect position, exaggerates this valvular incompetence. Even when some patients are horizontal, their varicose veins do not shrink as do healthy ones. As a result of continuous dilatation under pressure in the course of time a varicose vein becomes elongated, tortuous, pouched, thickened, inelastic and friable.

The term 'varicosity' is applied generally to those superficial vessels so affected in the lower limbs, but similar changes may also occur in veins in the anal canal, as haemorrhoids, and less often in the termination of the left spermatic cord as a varicocele. Other rare varices arise elsewhere, e.g. in the broad ligament, and in cases of portal hypertension at the lower end of the oesophagus.

Varicosities in the lower limbs by far outnumber all similar venous disorders and the purpose of this monograph is to describe these and their allied disorders.

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