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CHAPTER 11

Blood Vessels

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CHAPTER CONTENTS

Vascular pathology is responsible for more morbidity and mortality than any other category of human disease. Although the most clinically significant lesions involve arteries, venous disorders are not inconsequential. Two principal mechanisms underlie vascular disease:

- *Narrowing (stenosis)* or *complete obstruction* of vessel lumina, either progressively (e.g., by atherosclerosis) or precipitously (e.g., by thrombosis or embolism)
- *Weakening* of vessel walls, leading to dilation or rupture

To better appreciate the pathogenesis of vascular disorders, it is important to first understand normal blood vessels.

Vascular Structure and Function

The general architecture and cellular composition of blood vessels are similar throughout the cardiovascular system. However, structural specializations that reflect distinct functional roles characterize specific kinds of vessels (Fig. 11-1). For example, arterial walls are thicker than corresponding veins at the same level of branching to accommodate pulsatile flow and higher blood pressures. Arterial wall thickness gradually diminishes as the vessels become smaller, but the ratio of wall thickness to lumen diameter increases, allowing these muscular vessels to exert control over blood flow and pressure. Many disorders of the vasculature only affect particular types of vessels and thus have characteristic anatomic distributions. Thus, atherosclerosis affects mainly elastic and muscular arteries, hypertension affects small muscular arteries and arterioles, and different varieties of vasculitis characteristically involve only vessels of a certain caliber.

The basic constituents of the walls of blood vessels are endothelial cells and smooth muscle cells, admixed with a variety of extracellular matrix, including elastin, collagen, and glycosaminoglycans. The relative amount and configuration of the basic constituents differ along the vasculature owing to local adaptations to mechanical or metabolic needs. In arteries and veins, these constituents are organized into three concentric layers, the *intima, media,* and