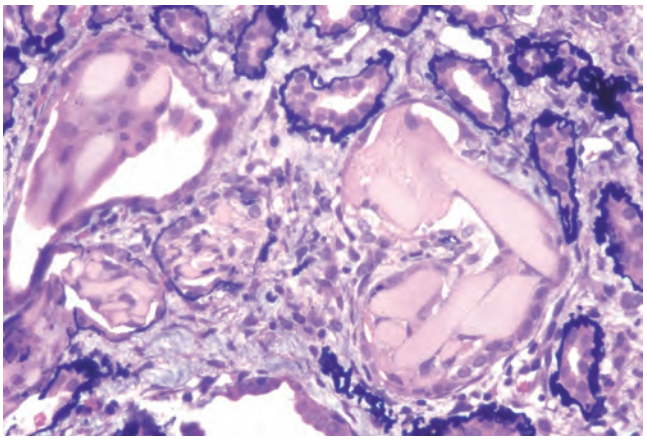

Figure 20-35 Light-chain cast nephropathy. Note the angulated and tubular casts, surrounded by macrophages, including multinucleate cells.

MORPHOLOGY

The tubulointerstitial changes in light-chain cast nephropathy are characteristic. The Bence-Jones tubular casts appear as pink to blue amorphous masses, sometimes concentrically laminated and often fractured, which fill and distend the tubular lumens. Some casts are surrounded by multinucleate giant cells that are derived from activated macrophages (Fig. 20-35). The adjacent interstitial tissue usually shows an inflammatory response and fibrosis. On occasion, the casts rupture the tubules, evoking a granulomatous inflammatory reaction. Amyloidosis, light-chain deposition disease, nephrocalcinosis, and infection may also be present.

Clinical Features. Clinically, the renal manifestations are of several types. In the most common form, *chronic kidney disease* develops insidiously and progresses slowly during a period of several months to years. Another form occurs suddenly and is manifested by *acute kidney injury* with oliguria. Precipitating factors include dehydration, hypercalcemia, acute infection, and treatment with nephrotoxic antibiotics. *Bence-Jones proteinuria* occurs in 70% of individuals with multiple myeloma; the presence of significant non-light-chain proteinuria (e.g., albuminuria) suggests AL amyloidosis or light-chain deposition disease.

Bile Cast Nephropathy

Hepatorenal syndrome refers to impairment of renal function in patients with acute or chronic liver disease with advanced liver failure. In this setting, serum bilirubin levels can be markedly elevated, particularly in jaundiced patients, with bile cast formation (also known as cholemic nephrosis) in distal nephron segments. The casts can extend to proximal tubules, resulting in both direct toxic effects on tubular epithelial cells and obstruction of the involved nephron. This mechanism of injury is analogous to that with myeloma protein and myoglobin casts. The tubular bile casts can range from yellowish-green to pink and contain variable degrees of sloughed cells or cellular debris. The reversibility of the renal injury depends upon the severity and duration of the liver dysfunction.

Vascular Diseases

Nearly all diseases of the kidney involve the renal blood vessels secondarily. Systemic vascular diseases, such as various forms of vasculitis, also affect renal vessels, and their effects on the kidney are often clinically important. Hypertension, as we discussed in Chapter 11, is intimately linked with the kidney, because kidney disease can be both a cause and consequence of increased blood pressure. In this chapter we discuss nephrosclerosis and renal artery stenosis, lesions associated with hypertension, and sundry lesions involving mostly smaller vessels of the kidney.

Nephrosclerosis

***Nephrosclerosis* is the term used for the renal pathology associated with sclerosis of renal arterioles and small arteries and is strongly associated with hypertension, which can be both a cause and a consequence of nephrosclerosis.** The affected vessels have thickened walls and consequently narrowed lumens, changes that result in focal parenchymal ischemia. Ischemia leads to glomerulosclerosis and chronic tubulointerstitial injury, and produces a reduction in functional renal mass. Nephrosclerosis at autopsy is associated with advanced age, is more frequent in blacks than whites, and may be seen in the absence of hypertension. Hypertension and diabetes mellitus, however, increase the incidence and severity of the lesions.

Pathogenesis. Two processes participate in the arterial lesions:

- Medial and intimal thickening, as a response to hemodynamic changes, aging, genetic defects, or some combination of these
- Hyalinization of arteriolar walls, caused by extravasation of plasma proteins through injured endothelium and by increased deposition of basement membrane matrix

MORPHOLOGY

The kidneys are either normal or moderately reduced in size, with average weights between 110 and 130 gm. The cortical surfaces have a fine, even granularity that resembles grain leather (Fig. 20-36). The loss of mass is due mainly to **cortical scarring and shrinking.**

On histologic examination there is narrowing of the lumens of arterioles and small arteries, caused by thickening and hyalinization of the walls **(hyaline arteriolosclerosis)** (Fig. 20-37). Corresponding to the finely granular surface are microscopic subcapsular scars with sclerotic glomeruli and tubular dropout, alternating with better preserved parenchyma. In addition, the interlobular and arcuate arteries show medial hypertrophy, replication of the internal elastic lamina, and increased myofibroblastic tissue in the intima, all of which narrow the lumen. This change, called fibroelastic hyperplasia, often accompanies hyaline arteriolosclerosis and increases in severity with age and in the presence of hypertension.

Consequent to the vascular narrowing, there is patchy ischemic atrophy, which consists of (1) foci of **tubular atrophy and interstitial fibrosis** and (2) a variety of **glomerular**