oblique course, terminating in a slitlike orifice. The obliquity of this intramural segment of the ureteral orifice permits the enclosing bladder musculature to act like a sphincteric valve, blocking the upward reflux of urine even in the presence of marked distention of the urinary bladder. As discussed in Chapter 20, a defect in the intravesical portion of the ureter leads to vesicoureteral reflux.

The close relationship of the female genital tract to the bladder makes possible the spread of disease from one tract to the other. In middle-aged and older women, relaxation of pelvic support leads to prolapse (descent) of the uterus, pulling with it the floor of the bladder. In this fashion the bladder is protruded into the vagina, creating a pouch *(cystocele)* that fails to empty readily with micturition. In males, the seminal vesicles and prostate have similar close relationships, being situated just posterior and inferior to the neck of the bladder. Thus, enlargement of the prostate, so common in middle to later life, constitutes an important cause of urinary tract obstruction. Subsequent sections discuss the major pathologic lesions of the ureters, urinary bladder, and urethra.

Ureters

Congenital Anomalies

Congenital anomalies of the ureters are found in about 2% or 3% of all autopsies. Although most have little clinical significance, certain anomalies may contribute to obstruction of the flow of urine and thus cause clinical disease. Anomalies of the ureterovesical junction that potentiate reflux are discussed with pyelonephritis in Chapter 20.

- **Double and bifid ureters**. Double ureters are almost invariably associated with totally distinct double renal pelves or with the anomalous development of a large kidney having a partially bifid pelvis terminating in separate ureters. Double ureters may pursue separate courses to the bladder but commonly are joined within the bladder wall and drain through a single ureteral orifice. Most are unilateral and of no clinical significance.
- **Ureteropelvic junction (UPJ) obstruction** is a congenital disorder that is the most common cause of hydronephrosis in infants and children. Cases that present early in life are bilateral in 20% of cases, are often associated with other congenital anomalies, and preferentially occur in males. There is agenesis of the contralateral kidney in a minority of cases. In adults, UPJ obstruction is more common in women and is most often unilateral. The condition has been ascribed to abnormal organization of smooth muscle bundles at the UPJ, to excess stromal deposition of collagen between smooth muscle bundles, or rarely to congenitally extrinsic compression of the UPJ by renal vessels.
- **Diverticula**, saccular outpouchings of the ureteral wall, are uncommon lesions that may be congenital or acquired. Most are asymptomatic, but urinary stasis within diverticula sometimes leads to recurrent infections. Dilation *(hydroureter)*, elongation, and tortuosity of the ureters may occur as congenital anomalies or as acquired defects.

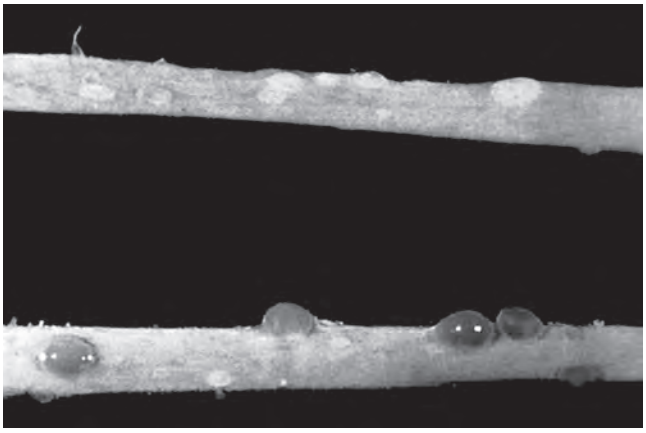

Figure 21-1 Opened ureters showing ureteritis cystica. Note smooth cysts projecting from the mucosa.

Inflammation

Ureteritis, though associated with inflammation, is typically not associated with infection and is of little clinical consequence.

MORPHOLOGY

The accumulation or aggregation of lymphocytes forming germinal centers in the subepithelial region may cause slight elevations of the mucosa and produce a fine granular mucosal surface **(ureteritis follicularis).** At other times the mucosa may become sprinkled with fine cysts varying in diameter from 1 to 5 mm lined by flattened urothelium **(ureteritis cystica)** (Fig. 21-1).

Tumors and Tumor-like Lesions

Primary tumors of the ureter are rare. Small benign tumors of the ureter are generally of mesenchymal origin. *Fibroepithelial polyp* is a tumor-like lesion that presents as a small mass projecting into the lumen, often in children. This lesion occurs more commonly in the ureters but may also involve the bladder, renal pelves, and urethra. The polyp is composed of loose, vascularized connective tissue overlaid by urothelium.

Primary malignant tumors of the ureter resemble those arising in the renal pelvis, calyces, and bladder. The majority are *urothelial carcinomas* (Fig. 21-2). They occur most frequently during the sixth and seventh decades of life and cause obstruction of the ureteral lumen. They are sometimes multifocal and commonly occur concurrently with similar neoplasms in the bladder or renal pelvis.

Obstructive Lesions

A great variety of lesions may obstruct the ureters and give rise to *hydroureter*, *hydronephrosis,* and sometimes *pyelonephritis* (Chapter 20). It is not the ureteral dilation that is of significance in these cases, but the consequent involvement of the kidneys. The more important causes, divided into those of intrinsic or extrinsic origin, are listed in Table 21-1.