



Figure 21-32 Simplified scheme of the pathogenesis of prostatic hyperplasia. The central role of the stromal cells in generating dihydrotestosterone (DHT) should be noted. DHT may also be produced in skin and liver by both type 1 and 2 5 α -reductase.

epithelial nodules arise. From their origin in this strategic location the nodular enlargements may encroach on the lateral walls of the urethra to compress it to a slitlike orifice (Fig. 21-33). In some cases, nodular enlargement may project up into the floor of the urethra as a hemispheric mass directly beneath the mucosa of the urethra, which is termed **median lobe hypertrophy**.

On cross-section, the nodules vary in color and consistency depending on their cellular content (Fig. 21-33B). Nodules that contain mostly glands are yellow-pink and soft, and exude a milky white prostatic fluid. Nodules composed primarily of fibromuscular stroma are pale gray and tough; these nodules do not exude fluid and are less clearly demarcated from the surrounding prostatic tissue. Although the nodules do not have true capsules, the compression of surrounding prostatic tissue creates a plane of cleavage about them.

Microscopically, glandular proliferation takes the form of aggregations of small to large to cystically dilated glands lined by two layers of cells, an inner columnar layer and an outer layer of cuboidal or flattened epithelium (Fig. 21-33C). Occasionally foci of reactive squamous metaplasia mimicking urothelial carcinoma are seen adjacent to prostatic infarcts in prostates with prominent BPH. The diagnosis of BPH cannot usually be made on needle biopsy because such biopsies are too small to appreciate the nodularity of the process and do not usually sample the transition zone where BPH occurs.

Clinical Features. The major clinical problem in those with BPH is urinary obstruction, which stems from the increased size of the prostate and the smooth muscle-mediated prostatic contraction. The increased resistance to urinary outflow leads to bladder hypertrophy and distention, accompanied by urine retention. The inability to empty the bladder completely creates a reservoir of residual urine that is a common source of infection. Patients

experience increased urinary frequency, nocturia, difficulty in starting and stopping the stream of urine, overflow dribbling, dysuria (painful micturition), and have an increased risk of developing bacterial infections of the bladder and kidney. In many cases, sudden, acute urinary retention occurs that requires emergency catheterization for relief.

Mild cases of BPH may be treated without medical or surgical therapy, such as by decreasing fluid intake, especially before bedtime; moderating the intake of alcohol and caffeine-containing products; and following timed voiding schedules. The most commonly used and effective medical therapy for symptoms relating to BPH are α -blockers, which decrease prostate smooth muscle tone via inhibition of α_1 -adrenergic receptors. Another common pharmacologic therapy aims to decrease symptoms by physically shrinking the prostate with an agent that inhibits the synthesis of DHT. Inhibitors of 5 α -reductase fall into this category. For moderate to severe cases recalcitrant to medical therapy, a wide range of more invasive procedures exist. Transurethral resection of the prostate (TURP) has been the gold standard in terms of reducing symptoms, improving flow rates, and decreasing post-voiding residual urine. It is indicated as a first line of therapy in certain circumstances, such as recurrent urinary retention. As a result of its morbidity and cost, alternative procedures have been developed. These include high-intensity focused ultrasound, laser therapy, hyperthermia, transurethral electrovaporization, and transurethral needle ablation using radiofrequency.

KEY CONCEPTS

Benign Prostatic Hyperplasia

- BPH is characterized by proliferation of benign stromal and glandular elements. DHT, an androgen derived from testosterone, is the major hormonal stimulus for proliferation.
- BPH most commonly affects the inner periurethral zone of the prostate, producing nodules that compress the prostatic urethra. On microscopic examination, the nodules exhibit variable proportions of stroma and glands. Hyperplastic glands are lined by two cell layers, an inner columnar layer and an outer layer composed of flattened basal cells.
- Clinical symptoms and signs are reported by 10% of affected patients and include hesitancy, urgency, nocturia, and poor urinary stream. Chronic obstruction predisposes to recurrent urinary tract infections. Acute urinary obstruction may occur.

Tumors

Adenocarcinoma

Adenocarcinoma of the prostate is the most common form of cancer in men, accounting for 29% of cancer in the United States in 2012. Prostate cancer is tied with colorectal cancer in terms of cancer mortality, causing 9% of cancer deaths in the United States in 2012. There is a one in six lifetime probability of being diagnosed with prostate cancer. It demonstrates a remarkably wide range of clinical