with signs or symptoms suggestive of BPH. However, this recommendation came under scrutiny because of its low yield for the detection of renal insufficiency secondary to obstructive uropathy. Serum creatinine measurement is no longer a routine part of the BPH work-up. According to the same clinical practice guidelines, PSA measurement is optional during the initial evaluation. PSA can function as a surrogate for prostate volume measurement in addition to being a screening test for prostate cancer. The Medical Therapy of Prostatic Symptoms (MTOPS) study, sponsored by the National Institutes of Health, demonstrated that PSA increases linearly with prostate volume and that a PSA level greater than 4 ng/mL conveys a 9% risk of requiring surgical therapy for benign disease over a 4.5-year period.

The following additional diagnostic tests are also considered optional; however, they may be useful, particularly in patients with moderate to severe AUA symptom scores, in determining whether the patient's symptoms are compatible with obstruction from BPH. Uroflowmetry is a noninvasive method of measuring urinary flow rate. The maximal urinary flow rate, Q_{max}, is considered the most useful measurement for identifying patients with BOO. However, patients with diminished flow rates may also have impaired bladder contraction. Typical values range from 25 mL/second in a young man without BOO to 10 mL/second or slower in a man with significant BOO. Of note, patients with a flow rate of less than 15 mL/second have better outcomes after transurethral resection of the prostate (TURP, discussed later). Measurement of postvoid residual (PVR) urine may be accomplished by urethral catheterization or, preferably, by ultrasonography. Elevated PVR volumes indicate an increased risk for acute urinary retention and eventual need for surgical intervention. The MTOPS study demonstrated that 7% of men with PVR greater than 39 mL required surgical intervention over a 4.5-year period. Elevation of PVR to greater than 200 mL raises the question of functional impairment of the bladder and warrants further evaluation with urodynamic testing.

Routine evaluation of the upper urinary tracts (kidneys and ureters) with excretory urography or ultrasonography is not recommended for the average BPH patient unless there is concomitant urinary pathology (i.e., hematuria, urinary tract infection, renal insufficiency, a history of prior urologic surgery, or a history of nephrolithiasis). Likewise, transrectal ultrasonography (TRUS) is not routinely recommended unless it is used for preoperative assessment of prostate gland size while planning surgical intervention.

DIFFERENTIAL DIAGNOSIS

Many conditions can cause LUTS in the aging male. A DRE and PSA testing are helpful in distinguishing between BPH and prostate cancer. Early-stage prostate cancer is typically asymptomatic, and patients can have both conditions concurrently. Although PSA testing is not sufficiently sensitive or specific to reliably differentiate BPH from prostate cancer, it is a useful tool to stratify a patient's risk for the presence of prostate cancer.

In response to ongoing controversy about PSA screening, the AUA released a new guideline in 2013 pertaining to the early detection (screening) of prostate cancer. According to this guideline, the purpose of early detection is to decrease prostate cancer mortality. Overall, the guideline recommends against routine prostate cancer screening (PSA and DRE) in men younger than 55 years of age. However, prostate cancer screening should be considered between the ages of 40 and 55 years in men who have higher risk of prostate cancer (i.e., family history or African American race). For men ages 55 to 69 years, the guideline recommends an individualized approach with discussion about the benefits of prostate cancer screening versus the known risks of screening and treatment. The guideline did not recommend screening in any man older than 70 years of age or in any man with less than 10 to 15 years of life expectancy.

Both the DRE and serum PSA determination have a role in the early diagnosis of prostate cancer. Prostate cancer typically arises from the peripheral portion of the prostate, which can be palpated on DRE. Induration or nodularity of the prostate on DRE should be considered suspicious for prostate cancer. PSA is a protein produced by both benign and malignant prostate cells. Serum PSA levels may be elevated in the face of prostate enlargement, inflammation, or cancer. Although an elevated PSA level is not diagnostic of prostate cancer, it can lead to a prostate biopsy to exclude cancer. Probably because of progressive enlargement in prostate size, serum PSA values increase as men age. The historical view that a PSA value lower than 4 ng/mL is "normal" has been abandoned since the recognition that PSA represents a continuum of risk based on age with no lower threshold. The comparative rate of change for PSA over time, sometimes termed *PSA velocity*, can be informative. In general, a change in PSA of more than 0.75 ng/mL is considered worrisome and may prompt a prostate biopsy.

Prostatitis is another condition that can cause LUTS. It may result from bacterial infection or from a nonbacterial inflammatory process, and the symptoms may substantially overlap those of BPH, particularly in older men. Diabetes mellitus, neurologic diseases such as Parkinson's disease or cerebrovascular disease, and other conditions of the urinary tract, such as urethral strictures, may result in LUTS in patients with BPH. Finally, many medications, particularly those with significant anticholinergic side effects, can cause symptoms mimicking those associated with BPH.

MEDICAL MANAGEMENT

Medical management is the preferred first-line treatment option for patients diagnosed with LUTS due to BPH. Most cases can be managed effectively with a minimum of side effects. The MTOPS study demonstrated that combination therapy with a long-acting α-blocker and a 5α-reductase inhibitor was more effective than single-agent therapy alone. In general, medical management is initiated for patients with moderate to severe AUA symptom scores. However, in the absence of indications for surgery (refractory urinary retention, hydronephrosis with or without renal impairment, recurrent urinary tract infections, recurrent gross hematuria, or bladder calculi), the decision to embark on any course of therapy, medical or otherwise, is principally driven by the bothersomeness of the patient's symptoms. Every patient has a different perception of his symptoms: Nocturia twice nightly may be a minor nuisance for some but may represent a significant problem for others. There is no absolute AUA symptom score or other objective measure that dictates the need for initiation of therapy for symptomatic BPH. Each patient