

Benign prostatic hyperplasia

Important Facts

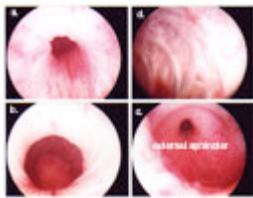
- Benign prostatic hyperplasia, BPH, also is called an enlarged prostate gland
- Tissue growth in the prostate gland is controlled by hormones
- An enlarged prostate can cause urinary symptoms

BPH is a common condition in men over the age of 50

Benign prostatic hyperplasia (BPH) is not simply a case of too many prostate cells. Prostate growth involves hormones, occurs in different types of tissue (e.g., muscular, glandular), and affects men differently. As a result of these differences, treatment varies in each case. There is no cure for BPH and once prostate growth starts, it often continues, unless medical therapy is started.

The prostate grows in two different ways. In one type of growth, cells multiply around the urethra and squeeze it, much like you can squeeze a straw. The second type of growth is middle-lobe prostate growth in which cells grow into the urethra and the bladder outlet area. This type of growth typically requires surgery.

Anatomy



a. & b. prostate interior
c. external sphincter
d. bladder trabeculation

The prostate is a walnut-sized gland located beneath the bladder and in front of the rectum. It is surrounded by a capsule of fibrous tissue called the prostate capsule. The urethra (tube that transports urine and sperm out of the body) passes through the prostate to the bladder neck. Prostate tissue produces prostate specific antigen and prostatic acid phosphatase, an enzyme found in seminal fluid (the milky substance that combines with sperm to form semen).

Incidence and Prevalence

Interior Image of Prostate

It is difficult to establish incidence and prevalence of BPH because research groups often use different criteria to define the condition.

According to the National Institutes of Health (NIH), BPH affects more than 50% of men over age 60 and as many as 90% of men over the age of 70.

Risk Factor

BPH is a condition of aging. Nearly all men over the age of 50 have an enlarged prostate.

Causes

The cause of benign prostatic hyperplasia is unknown. It is possible that the condition is associated with hormonal changes that occur as men age. The testes produce the hormone testosterone, which is converted to dihydrotestosterone (DHT) and estradiol (estrogen) in certain tissues. High levels of dihydrotestosterone, a testosterone derivative involved in

prostate growth, may accumulate and cause hyperplasia. How and why levels of DHT increase remains a subject of research.

Signs and Symptoms

Common symptoms of benign prostatic hyperplasia include the following:

- Blood in the urine (i.e., hematuria), caused by straining to void
- Dribbling after voiding
- Feeling that the bladder has not emptied completely after urination
- Frequent urination, particularly at night (i.e., nocturia)
- Hesitant, interrupted, or weak urine stream caused by decreased force
- Leakage of urine (i.e., overflow incontinence)
- Pushing or straining to begin urination
- Recurrent, sudden, urgent need to urinate

In severe cases of BPH, another symptom, **acute urinary retention** (the inability to urinate), can result from holding urine for a long time, alcohol consumption, long period of inactivity, cold temperatures, allergy or cold medications containing decongestants or antihistamines, and some prescription drugs (e.g., ipratropium bromide, albuterol, epinephrine). Any of these factors can prevent the urinary sphincter from relaxing and allowing urine to flow out of the bladder. Acute urinary retention causes severe pain and discomfort. Catheterization may be necessary to drain urine from the bladder and obtain relief.\

Diagnosis

A physical examination, patient history, and evaluation of symptoms provide the basis for a diagnosis of benign prostatic hyperplasia. The physical examination includes a digital rectal examination (DRE), and symptom evaluation is obtained from the results of the AUA Symptom Index.

Digital rectal examination (DRE)

DRE typically takes less than a minute to perform. The doctor inserts a lubricated, gloved finger into the patient's rectum to feel the surface of the prostate gland through the rectal wall to assess its size, shape, and consistency. Healthy prostate tissue is soft, like the fleshy tissue of the hand where the thumb joins the palm. Malignant tissue is firm, hard, and often asymmetrical or stony, like the bridge of the nose. If the examination reveals the presence of unhealthy tissue, additional tests are performed to determine the nature of the abnormality.

AUA Symptom Index

The AUA (American Urological Association) Prostate Symptom Index is a questionnaire designed to determine the seriousness of a man's urinary problems and to help diagnose BPH. The patient answers seven questions related to common symptoms of benign prostatic hyperplasia. How frequently the patient experiences each symptom is rated on a scale of 1 to 5. These numbers added together provide a score that is used to evaluate the condition. An AUA score of 0 to 7 means the condition is mild; 8 to 19, moderate; and 20 to 35, severe.

PSA and PAP Tests

Blood tests taken to check the levels of prostate specific antigen (PSA) and prostatic acid phosphatase (PAP) in a patient who may have benign prostatic hyperplasia helps the physician eliminate a diagnosis of prostate cancer.

Prostate-specific antigen (PSA) is a specific antigen produced by the cells of the prostate capsule (membrane covering the prostate) and periurethral glands. Patients with benign prostatic hyperplasia (BPH) or prostatitis produce larger amounts of PSA. The PSA level also is determined in part by the size and weight of the prostate.

The test measures the amount of PSA in the blood in nanograms per milliliter (ng/mL). A PSA of 4 ng/mL or lower is normal; 4–10 ng/mL is slightly elevated; 10–20 is moderately elevated; and 20–35 is highly elevated. Most men with slightly elevated PSA levels do not have prostate cancer, and many men with prostate cancer have normal PSA levels. A highly elevated level may indicate the presence of cancer.

The PSA test can produce false results. A false positive result occurs when the PSA level is elevated and there is no cancer. A false negative result occurs when the PSA level is normal and there is cancer. Because of this, a biopsy is usually performed to confirm or rule out cancer when the PSA level is high.

Free and total PSA (also known as PSA II) PSA in the blood may be bound molecularly to one of several proteins or may exist in a free, or unbound, state. Total PSA is the sum of the levels of both forms; free PSA measures the level of unbound PSA only. Studies suggest that malignant prostate cells produce more bound PSA; therefore, a low level of free PSA in relation to total PSA might indicate a cancerous prostate, and a high level of free PSA compared to total PSA might indicate a normal prostate, BPH, or prostatitis.

Age-specific PSA Evidence suggests that the PSA level increases with age, a PSA up to 2.5 ng/mL for men age 40–49 is considered normal, as is 3.5ng/mL for men age 50–59, 4.5 ng/mL for men age 60–69, and 6.5 ng/mL for men 70 and older. The use of age-specific PSA levels is not endorsed by all medical professionals.

Urodynamic Testing

Urodynamic tests, usually performed in a physician's office, are used to measure the volume and pressure of urine in the bladder and to evaluate the flow of urine. They are particularly useful for the diagnosis of Intrinsic sphincter deficiency and uncertain cases of mixed, overflow, urgency, or total incontinence. Additional tests may be conducted if symptoms indicate that blockage is caused by a condition other than BPH.

Uroflowmetry is a simple test performed to record urine flow, to determine how quickly and completely the bladder can be emptied, and to evaluate obstruction. With a full bladder, the patient urinates into a device that measures the amount of urine, the time it takes for urination, and the rate of urine flow. Patients with stress or urge incontinence usually have a normal or increased urinary flow rate, unless there is an obstruction in the urinary tract. A reduced flow rate may indicate BPH.

A **pressure flow study** measures pressure in the bladder during urination and is designed to detect a blockage of flow. It is the most accurate way to evaluate urinary blockage. This test requires the insertion of a catheter through the urethra in the penis and into the bladder. The procedure is uncomfortable and rarely may cause urinary tract infection (UTI).

Post-void residual (PVR) test measures the amount of urine that remains in the bladder after urination. The patient is asked to urinate immediately prior to the test and the residual urine is determined by ultrasound or catheterization. PVR less than 50 mL generally indicates adequate bladder emptying and measurements of 100 to 200 mL or higher often indicate blockage. Nervousness and other types of stress may affect the result; therefore, the test is often repeated.

Treatment Options

Treatment options for enlarged prostate, or benign prostatic hyperplasia (BPH), may include the following:

- Medical
 - Watchful waiting
 - Medications (e.g., alpha blockers)
 - Prostatic stents
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- Minimally invasive treatments (thermotherapy)
 - Laser (e.g., non-contact, contact, interstitial types)
 - Microwave (e.g., TUMT)
 - Other thermotherapies (e.g., ProstateTM RF therapy [previously known as TUNA])
- Surgical treatments
 - Transurethral resection of the prostate (TURP)
 - Holmium laser enucleation of the prostate (HoLEP)
 - Prostatectomy
 - Transurethral incision of the prostate (TUIP)
 - Transurethral ultrasound-guided laser incision of the prostate (TULIP)
- Alternative treatments
 - Nutrition
 - Supplements
 - Herbal remedies
 - Hydrotherapy

Medical Treatment

There are several treatment options for men with benign prostate hyperplasia, depending on the severity of symptoms. If symptoms do not threaten the man's health, he may choose not to be treated. If symptoms are severe enough to cause discomfort, interfere with daily activities, or threaten health, treatment is usually recommended.

Watchful waiting

Men with mild symptoms may choose to return for annual examinations. The physician will perform an examination that includes a DRE, PSA tests, and a urinary flow rate. The patient will be asked to describe symptoms in order to determine if the condition is worsening.

Medication

5-Alpha reductase inhibitors such as finasteride (Proscar®) and dutasteride (Avodart®) prevent the conversion of testosterone to the hormone dihydrotestosterone (DHT). In many cases, a treatment period of 6-month is necessary to see if the therapy is going to work. These drugs are taken orally, once a day. Finasteride is available in tablet form and dutasteride is available as soft gelatin capsules. Patients should see their physician regularly to monitor side effects and adjust the dosage, if necessary.

Side effects include reduced libido, impotence, breast tenderness and enlargement, and reduced sperm count. Long-term risks and benefits have not been studied.

Women who may be pregnant must avoid handling dutasteride capsules and broken or crushed finasteride tablets because exposure to the drugs may cause serious side effects to the fetus. Intact tablets are coated to prevent absorption through the skin during normal handling. Patients should wait at least 6 months after dutasteride treatment to donate blood to prevent pregnant women from being exposed to the drug through blood transfusion.

Alpha blockers relax smooth muscle tissue in the bladder neck and prostate, which increases urinary flow. They typically are taken orally, once or twice a day.

Commonly prescribed alpha blockers include the following:

- alfuzosin (UroXatral®), extended-release tablet taken once daily
- doxazosin (Cardura®), tablet taken once daily
- prazosin (Minipress®), capsule taken 2 or 3 times daily
- tamsulosin hydrochloride (Flowmax®), capsule taken once daily
- terazosin (Hytrin®), capsule taken once daily

Patients taking an alpha blocker require follow-up during the first 3 or 4 weeks to evaluate the effect on symptoms and adjust the dosage, if necessary. **Side effects** include headache, dizziness, low blood pressure, fatigue, weakness, and difficulty breathing. Long-term risks and benefits have not been studied.

Prostatic stents

Although a prostatic stent is not a medical treatment, neither does it fall under the classification of a surgical procedure. Prostatic stents are used most often for patients with significant medical problems that prohibit medication or surgery. It is a tiny, springlike device inserted into the urethra. When expanded, it pushes back the surrounding tissue and widens the urethra. Prostatic stents have several **advantages**:

- They can be placed in less than 15 minutes under regional anesthesia.
- Bleeding during and after surgery is minimal.

- The patient can be discharged the same day or the next morning.

There are also several **disadvantages**:

- Prepositioning can be difficult.
- They may cause irritation and frequent urination.
- They may cause pain or incontinence.
- Removing them (necessary in one-third of cases) can be difficult.

Minimally Invasive Treatment

Minimally invasive BPH treatments use state-of-the-art tools and techniques to reduce or eliminate symptoms. Men are treated on an outpatient basis in a urologist's office or the hospital.

Other **advantages** of minimally invasive treatments are

- less pain,
- faster recovery,
- lower costs, and
- local anesthesia and mild sedative.

Usually, heat is used to destroy excess prostate tissue. Techniques differ in heat source, heat delivery method, side effects, and number of treatments. **Delivery methods** include:

Laser (e.g., non-contact, contact, interstitial)

- Indigo®
- PVP
- HoLAP

Microwave

- CoreTherm®
- Cooled ThermoTherapy™/TUMT™
- TherMatrx®
- Prolieve™

Other

- AquaTherm™ System
- Prostiva™ RF Therapy, previously known as TUNA
- TUVF
- HIFU

Patients who want to stop taking medication or whose medication no longer improves symptoms may elect to have one of these procedures. However, patients with severely enlarged prostates and whose bladders do not work properly may not be good candidates.

Prior to diagnosis and treatment of BPH, a prostate-specific antigen (PSA) test and digital rectal examination (DRE) are performed to rule out prostate cancer. A transrectal ultrasound and cystoscopy also may be performed to determine if prostatectomy or TURP is indicated.

Laser Treatments

Interstitial Laser Coagulation

Interstitial laser coagulation is often performed under local anesthesia on an outpatient basis. The Indigo LaserOptic Treatment® System uses a cystoscope through which a fiberoptic probe is directly introduced into the prostate. Heat energy is conducted through the probe for 3 minutes and quickly coagulates the obstructing prostate tissue.

The process can be repeated to treat another area in the prostate, as determined by the physician. The procedure lasts approximately 30 to 60 minutes. Symptoms resolve over 6 to 12 weeks, as tissue is absorbed.

After the device is removed, a Foley catheter is inserted to drain urine for several days, until bladder function returns. Blood in the urine is a common side effect of the procedure and resolves within a week or so. Erectile dysfunction (impotence), retrograde ejaculation, and incontinence are rare complications.

PVP

Photoselective vaporization of the prostate (PVP) is a minimally invasive procedure that uses a special high-energy laser (e.g., GreenLight PVP™ Laser) to vaporize excess prostate tissue and seal the treated area. The procedure is performed on an outpatient basis in a hospital or surgical center and may be performed under local, spinal, or general anesthesia. PVP takes between 10 and 30 minutes to perform, depending on the size of the prostate and patients are usually discharged within a few hours.

The type of laser used in PVP is delivered to the prostate through an endoscope (device that consists of a tube and an optical system) that is inserted into the urethra. The procedure prevents damage to surrounding tissue and minimizes side effects such as pain, blood in the urine (hematuria), and swelling.

Many patients do not require a catheter after PVP, and those who do typically are catheterized for less than 24 hours. Patients are advised to avoid strenuous exercise for 2 weeks following the procedure and can usually resume regular activities the next day. PVP provides immediate and long-lasting results comparable with other minimally invasive procedures.

HoLAP

HoLAP (holmium laser ablation of the prostate) involves using a laser to vaporize obstructive prostatic tissue. The decision whether to use HoLAP or HoLEP (holmium enucleation of the prostate) is based primarily on the size of the prostate. Ablation usually is performed when the prostate is smaller than 60 cc (cubic centimeters).

HoLAP offers many of the same advantages as HoLEP when compared to traditional surgery (e.g., TURP). These potential benefits include a shorter hospital stay, less bleeding and shorter catheterization and recovery times.

Patients who undergo HoLAP usually do not require overnight hospitalization and in most cases, the catheter is removed the same day or the morning following the procedure.

Microwave Treatments

Cooled ThermoTherapy™/TUMT™

Cooled ThermoTherapy™/TUMT™ reduces BPH symptoms, preserves sexual function, and provides durable results using the Targis® system or the Prostatron® system. Treatment can be completed within 30 minutes, usually does not require anesthesia, and is performed in a physician's office or an outpatient setting.

In this treatment, a specially designed antenna inside a catheter is inserted into the prostate through the urethra. This antenna is used to direct microwave energy into the prostate to heat and destroy enlarged tissue. During the procedure, cool water is circulated through the catheter to minimize patient discomfort, protect adjacent urethral tissues from excessive temperatures, and reduce the risk for serious side effects.

Medication is often administered to reduce discomfort and help patients relax during the procedure. Many patients are able to read, watch television, or listen to music during treatment and some may experience the following:

- Bladder spasms
- Pressure in the rectum
- Sensation of needing to empty the bladder or have a bowel movement
- Warm or burning sensation in the abdomen or penis

Following treatment, anti-inflammatory medication and antibiotics may be prescribed. Most patients can resume normal activity immediately after treatment. Destroyed prostatic tissue is reabsorbed by the body or discharged in the urine over the course of 6 to 12 weeks and BPH symptoms gradually improve during this time.

Side effects usually resolve without intervention within a few weeks of treatment and include the following:

- Frequent urination
- Pink discharge in the urine or around the catheter
- Soreness in the lower abdomen
- Urethral inflammation and swelling (most patients require catheterization for 2–5 days)
- Urgency (even after removal of the catheter)

CoreTherm

An outpatient, microwave-generated heat treatment that destroys excess prostate tissue. CoreTherm uses a transurethral catheter containing a microwave antenna and an intraprostatic probe with three temperature sensors. This system takes into account the fact that different patients have differently sized prostates and different intraprostatic blood flows.

Continuous monitoring of intraprostatic temperatures, intraprostatic blood flow rate, progressive destruction of targeted tissue, and adjustable microwave power enable the physician to tailor treatment to the individual. These data are calculated and displayed in real time on a computer screen throughout the session, which helps the physician determine when to stop treatment.

Before the procedure, the bladder and bowel are emptied, and the patient is given a sedative, local anesthesia, and antibiotics. Urinary retention is a common temporary side effect. A urinary catheter is placed after treatment and removed within a couple of weeks.

TherMatrx

TherMatrx® is a minimally invasive procedure performed in a urologist's office that uses heat delivered through a microwave antenna. This outpatient procedure requires local anesthesia. A mild sedative or pain reliever may be given to help the patient relax and make him as comfortable as possible during the procedure.

A urethral catheter containing the microwave antenna is passed through the urethra and prostate gland and is secured by a balloon at the tip of the catheter that passes through the urethral sphincter. Localized microwave energy is delivered at a temperature high enough to relieve BPH symptoms, including difficult, frequent, or urgent urination. The procedure lasts approximately 1 hour.

Following the procedure, a catheter is inserted to drain urine from the bladder for a few days. Once the catheter is removed, the patient can resume normal activity. Symptoms improve in 4 to 6 weeks. Healing takes 6 weeks to 3 months.

Possible complications include incontinence, pain during urination, and urinary retention. Most complications resolve during the healing period without intervention.

Prolieve

Prolieve™ Thermodilatation System is a transurethral microwave thermotherapy (TUMT) device that also uses a special balloon catheter to open up (dilate) the urethra, as well as microwave energy to heat and destroy enlarged prostatic tissue. In this procedure, the balloon catheter is filled with warm water. After the temperature of the tissue returns to normal, the urethra remains open. Prolieve™, which takes about 45 minutes, is performed in a physician's office under local anesthesia. In a recent study, about 5% of patients required catheterization following the procedure.

Other Minimally Invasive Treatments

AquaTherm

The AquaTherm™ System uses water-induced thermotherapy (WIT) to destroy obstructive prostatic tissue and reopen the urethra. WIT can be performed in ambulatory surgery, outpatient surgery, or a physician's office. It takes only 45 minutes and does not require general anesthesia.

A catheter made up of four contiguous sections - the urinary drainage lumen, the positioning balloon, the treatment balloon, and the insulated shaft - is attached to a computer console that heats water to 60° C (140° F). Throughout the procedure, the computer console precisely maintains the water temperature at 60° C, and urine is allowed to pass by means of the urinary drainage lumen.

The urologist inserts the catheter through the urethra and into the bladder. Once the urinary drainage lumen and the positioning balloon reach the bladder, the positioning balloon inflates and secures the catheter. The treatment balloon, resting in the prostatic urethra (located directly below the bladder), inflates and fills with water. Temperature-controlled water circulates through the insulated shaft into the treatment balloon. The catheter conducts heat through the insulated shaft to the prostate gland, raises the temperature of the gland, and destroys the obstructive tissue. Destroyed tissue is either sloughed off or absorbed by the body over time. After 45 minutes of treatment, the catheter is removed.

Following the procedure, a urethral catheter remains in place for approximately 4 to 17 days, or until normal urinary flow is restored. Temporary hematuria, or blood in the urine, is usually present after the procedure, and treatable urinary tract infection or urinary urgency also may occur.

Prostiva RF therapy

Prostiva™ RF therapy, previously known as TUNA, may be used to treat symptoms of BPH in patients over the age of 50. RF therapy uses low-level radio frequency (RF) energy to destroy excess prostatic tissue, without damaging the urethra or surrounding healthy tissue. In this procedure, a small probe is inserted into the prostate through the urethra, and two electrodes are used to apply a low level of RF energy, which is directed to specific areas of the prostate to relieve obstruction.

RF therapy is performed in an office or hospital outpatient center and typically does not require general anesthesia. The procedure usually takes less than 1 hour to perform and often relieves BPH symptoms within 2 to 6 weeks.

Most patients are able to resume regular activity in 24–48 hours. Catheterization (usually not longer than 3 days) may be necessary following treatment. **Side effects**, which are usually minor and resolve without intervention during the healing period, include blood in the urine (hematuria), obstruction, discomfort or pain (may be relieved using over-the-counter pain relievers), and urinary tract infection (UTI; may require long-term medication).

Long-term **complications** (e.g., urinary retention, sexual dysfunction) are unusual and occur less often than following conventional procedures such as TURP.

TUVP

Transurethral vaporization of the prostate (TUVP), also called **vaportrode**, involves direct application of heat (under 100° F) to the prostate tissue with a grooved roller-bar that vaporizes tissue. The immediate tissue loss leads to quick improvement of symptoms. The procedure takes from 20 to 65 minutes. The catheter is usually removed within 24 hours and most patients go home within 2 days.

High Intensity Focused Ultrasound (HIFU)

High intensity focused ultrasound (HIFU) is currently undergoing clinical trials in the United States. HIFU is a noninvasive treatment that uses precision-focused ultrasound waves to heat and destroy (ablate) targeted prostatic tissue without affecting healthy surrounding tissue. It has been shown to effectively treat BPH as well as localized prostate cancer. The Food and Drug Administration (FDA) has not yet approved this treatment in the United States.

In clinical trials, HIFU is performed on an outpatient basis, under anesthesia. HIFU can be repeated as necessary, and each treatment takes 1–3 hours. Following treatment, a catheter is necessary for about 1 week and most patients are able to resume regular activities within days. **Impotence** occurs in 1–7% of patients.

Surgical Treatment

Surgery involves removing the enlarged part of the prostate that constricts the urethra. It is recommended for patients who experience serious complications, such as the following:

- Bleeding through the urethra as a result of BPH
- Damage to the kidneys caused by urine backing up
- Frequent urinary tract infections
- Inability to urinate
- Stones in the bladder

TURP

Transurethral resection of the prostate (TURP) is the gold standard to which other surgeries for BPH are compared. This procedure is performed under general or regional anesthesia and takes less than 90 minutes.

The surgeon inserts an instrument called a resectoscope into the penis through the urethra. The resectoscope is about 12 inches long and 3/8 of an inch in diameter. It contains a light, valves for controlling irrigating fluid, and an electrical loop to remove the obstructing tissue and seal blood vessels. The surgeon removes the obstructing tissue and the irrigating fluids carry the tissue to the bladder. This debris is removed by irrigation and any remaining debris is eliminated in the urine over time.

Patients usually stay in the hospital for about 3 days, during which time a catheter is used to drain urine. Most men are able to return to work within a month. During the recovery period, patients are advised to

- avoid heavy lifting, driving, or operating machinery;
- drink plenty of water to flush the bladder;
- eat a balanced diet;
- use a laxative if necessary to prevent constipation and straining during bowel movements.

Complications

Blood in the urine (hematuria) is common after TURP surgery and usually resolves by the time the patient is discharged. Bleeding also may result from straining or activity. Postsurgical bleeding should be reported to the urologist immediately.

Some patients have initial discomfort, a sense of urgency to urinate, or short-term difficulty controlling urination. These conditions slowly improve as recovery progresses, but it is important to remember that the longer the urinary problems existed before surgery, the longer it takes to regain full and normal bladder function after surgery.

Up to 30% of men who undergo TURP experience problems with sexual function. Complete recovery of sexual function may take up to 1 year. The most common, long-term side effect of prostate surgery is retrograde ejaculation (dry climax), which results when the muscle that closes the bladder neck during ejaculation is removed along with the obstructing prostate tissue. Semen enters the wider opening to the bladder instead of being expelled through the penis, causing sterility but not affecting the man's ability to experience sexual pleasure. This complication is not an issue for most men requiring prostate surgery.

HoLEP

Holmium laser enucleation of the prostate (HoLEP) produces results that are similar to TURP with fewer complications (e.g., less intraoperative bleeding). In this procedure, a holmium laser is used to remove obstructive prostatic tissue and seal blood vessels. HoLEP is usually performed as a day procedure in the hospital.

Benefits of HoLEP over traditional surgery include the following:

- Shorter hospital stay
- Shorter catheterization time
- Shorter recovery time

Approximately 10–15% of patients with large prostates (>100 gm) experience stress incontinence after undergoing HoLEP. In most cases, incontinence resolves within 6 weeks.

Prostatectomy

If the prostate is greatly enlarged, if the bladder has been damaged, or if the patient has complications prohibiting transurethral surgery, prostatectomy (removal of the obstructing prostate) may be necessary. This procedure is sometimes the best and safest approach.

Prostatectomy is performed under general or regional anesthesia. The surgeon makes an external incision in the lower abdomen or in the perineum (area between the rectum and the scrotum). If the surgeon accesses the prostate from the abdomen, the procedure is called **suprapubic** or **retropubic** prostatectomy; surgery through the perineum is called **perineal** prostatectomy. Once access is gained, the prostate is removed.

After prostate surgery, a urinary catheter is inserted to ensure bladder emptying. Urine output and color and continuous bladder irrigation (CBI), if present, are monitored. Blood in the urine is an expected side effect of prostate surgery. CBI is used to maintain the effectiveness of the urinary catheter, remove blood clots, and cleanse the surgical area. If bladder spasms occur, the surgeon should be notified.

Once they have been discharged from the hospital, patients should abstain from sexual intercourse for 6 weeks after surgery. Strenuous activity and lifting is to be avoided throughout the recovery period, which can take up to 8 weeks.

Potential complications include incontinence and impotence. Depending on the procedure, stress urinary incontinence may result when pressure is put on abdominal muscles. Urge incontinence and involuntary passing of urine while asleep also may occur.

Patients are encouraged to use Kegel exercises to strengthen pelvic floor muscles and to increase their water intake. Ejaculatory dysfunction and erectile dysfunction (impotence) may occur, depending on the procedure.

TUIP

Transurethral incision of the prostate (TUIP) may be recommended to treat a prostate that is not greatly enlarged. The surgeon makes one or more cuts in the bladder neck where the urethra joins the bladder, extending into the prostate. This reduces the prostate's pressure on the urethra and makes urination easier. TUIP may provide relief with a lower incidence of retrograde ejaculation than TURP. However, its long-term benefits and risks compared to TURP have not been established.

TULIP

Transurethral ultrasound-guided laser incision of the prostate (TULIP) is a new procedure that is similar to TUIP, except that the cuts are made with a laser.