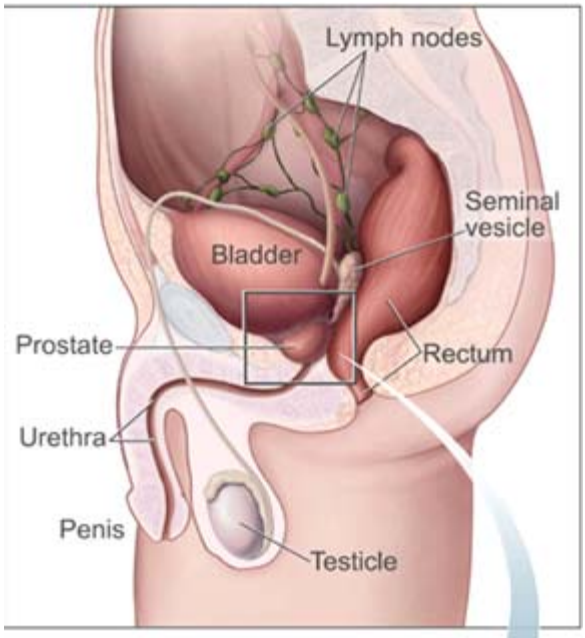
# BENIGN PROSTATIC HYPERPLASIA (BPH)

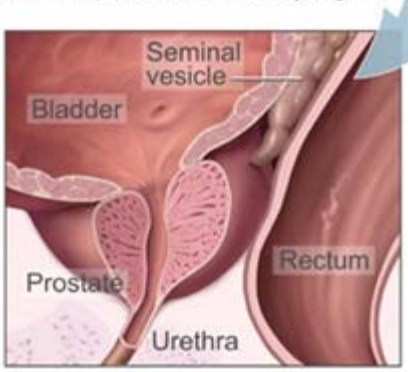


## 1. STRUCTURE

A healthy human prostate is slightly larger than a walnut. It surrounds the urethra just below the urinary bladder and can be felt during a rectal exam.
The ducts are lined with transitional epithelium.
Within the prostate, the urethra coming from the bladder is called the prostatic urethra and merges with the two ejaculatory ducts. The male urethra has two functions: to carry urine from the bladder during urination and to carry semen during ejaculation[1].




This shows the prostate and nearby organs.




This shows the inside of the prostate, urethra, rectum, and bladder.

The prostate can be divided in two different ways: by zone, or by lobe.

## 1.1. Zones

The "zone" classification is more often used in pathology.

The prostate gland has four distinct glandular regions, two of which arise from different segments of the prostatic urethra:

| Name | Percent | Description |
|---|---|---|
| The Peripheral Zone (PZ) | Comprises up to 70% of the normal prostate gland in young men | The sub-capsular portion of the posterior aspect of the prostate gland which surrounds the distal urethra. It is from this portion of the gland that more than 70% of prostatic cancers originate. |
| The Central | Constitutes | This zone surrounds the ejaculatory ducts. |

| | | |
|---|---|---|
| Zone (CZ) | approximately 25% of the normal prostate gland | Central zone tumours account for more than 25% of all prostate cancers. |
| The Transition Zone (TZ) | Responsible for 5% of the prostate volume | This zone is very rarely associated with carcinoma. The transition zone surrounds the proximal urethra and is the region of the prostate gland which grows throughout life and is responsible for the disease of benign prostatic enlargement. |
| The Anterior Fibro-muscular zone (or stroma) | Accounts for approximately 5% of the prostatic weight | This zone is usually devoid of glandular components, and composed only, as its name suggests, of muscle and fibrous tissue. |

## 1.2 Lobes

The "lobe" classification is more often used in gross anatomy.

| | |
|---|---|
| anterior lobe (or isthmus) | roughly corresponds to part of Transitional Zone |
| posterior lobe | roughly corresponds to Peripheral Zone |
| lateral lobes | spans all zones |
| median lobe (or middle lobe) | roughly corresponds to part of Central Zone |

## 2. DEFINITION

- Benign prostatic hyperplasia (BPH) refers to a regional nodular growth of varying combinations of glandular and stromal proliferation that occurs in almost all men who have testes and who live long enough.
- Histopathologically BPH is characterized by an increased number of epithelial and stromal cells in the periurethral area of the prostate
- Macroscopic BPH refers to organ enlargement due to the cellular changes
- Clinical BPH refers to the lower urinary tract symptoms thought due to benign prostatic obstruction.

### 3. RISK FACTORS FOR BPH

- No convincing evidence exists regarding a positive correlation for any factors other than age and the presence of testes.
- BPH does appear to have an inheritable genetic component, although the specifics are yet to be elucidated.
- Autopsy data indicates that anatomic (microscopic) evidence of BPH is seen in about[2]:

    - 25 percent of men age 40 to 50 year
    - 50 percent of men age 50 to 60,
    - 65 percent of men age 60 to 70,
    - 80 percent of men age 70 to 80,
    - 90 percent of men age 80 to 90.

- It has been classically stated that from 25 to 50 percent of individuals with microscopic and macroscopic evidence of BPH will progress to clinical BPH[3].
- Depending on the definition (urodynamic, macroscopic, etc.), the prevalence of clinical BPH in an individual community in men ages 55 to 74 years may vary from less than 5 percent to more than 30 percent[4].
- Only 40 percent of this group, however, complain of lower urinary tract symptoms (LUTS)

# 4. DIAGNOSIS

## 4.1. Symptoms of BPH

- Lower Urinary Tract Symptoms LUTS

1. The symptoms related to bladder outlet obstruction due to BPH have, in the past, arbitrarily been described as a group as "prostatism" .
2. Prostatism is categorized as

    - Obstructive symptoms
        - Impairment in the size/force of the urinary stream
        - Hesitancy and/or abdominal straining
        - Intermittent or interrupted flow
        - A sensation of incomplete emptying
    - Irritative symptoms
        - Nocturia
        - Daytime frequency
        - Urgency
        - Urge incontinence
        - Dysuria. .

3. LUTS (lower urinary tract symptoms) is a rubric, introduced by Abrams, to replace the term "prostatism," as well the terminology of "irritative" and "obstructive" **s**ymptoms [5,6]**.**

    - Filling and storage symptoms (irritative symptoms)
    - Voiding (emptying) symptoms (obstructive symptoms)

**4.2. Signs of BPH**

- Detectable anatomic enlargement of the prostate on physical examination or imaging.

    1. There is no clear relationship between the degree of anatomic enlargement and the severity of symptoms or the degree of urodynamic changes.

- Bladder changes secondary to obstruction can occur.
    1. Bladder wall thickening
    2. Trabeculation (which are also associated with involuntary bladder contractions)
    3. Bladder diverticula (which could also be congenital).
    4. Bladder calculi
    5. Bladder decompensation can occur, and gross bladder distention can result.
    6. Chronically increased residual urine volumes
    7. Persistent urinary infection
    8. Acute urinary retention may supervene
    9. Azotemia
    10. Upper tract changes.
        - Ureterectasis, hydroureter, and/or hydronephrosis

**4.3. Urodynamics**

Urodynamics is the study of pressure and flow relationships during the storage and transport of urine within the urinary tract. A urodynamics study is a series of different tests done on the bladder to determine the cause of the patient's symptoms. The goal is to reproduce the patient's symptoms so the cause of the problem can be treated[7].
Urodynamic features of BPH are:

- Decreased mean and peak flow rates, an abnormal flow pattern characterized by a long low plateau
- Elevated detrusor pressures at the initiation of and during flow
- May or may not have increased residual urine
- 50 percent of BPH patients are found to have bladder hyperactivity during filling.
    1. Pressure flow urodynamics are necessary to distinguish between patients with obstructive BPH and patients who have inadequate detrusor contractility, the symptoms of which may be identical.
- A reduction in the detrusor pressure with an increased uroflow urodynamically after prostatectomy indicates a successful treatment.

**4.4. Evaluation of LUTS suspected of being BPH**

- The essentials of the initial evaluation include:

    1. History

2. Digital rectal and focused physical examinations
3. Urinalysis
4. Urine cytology in those with significant irritative symptoms
5. Serum creatinine
6. Trans-rectal ultrasound
7. Renal ultrasound (if creatinine abnormal)
8. A standardized symptom assessment, such as the AUA symptom index [8]

American Urological Association (AUA) symptom index

The American Urological Association (AUA) has developed the following questionnaire to help men determine how bothersome their urinary symptoms are and to check the effectiveness of treatment. This questionnaire has also been adopted worldwide and is known as the International Prostate Symptom Score (IPSS). It is sometimes seen with a Quality of Life Scale at the end of the questionnaire.

Use the following point scale to answer each of the questions. Total the score from all the questions.

0 = Not at all
1 = Less than once in 5 times you have urinated
2 = Less than half the time
3 = About half the time
4 = More than half the time
5 = Almost always

Over the past month, how often have you:

| | |
|---|---|
| | Had the sensation of not completely emptying your bladder after you finished urinating? |
| | Had to urinate again less than 2 hours after you finished urinating? |
| | Found that you stopped and started again several times when you urinated? |
| | Found it difficult to postpone urination? |
| | Had a weak urinary stream? |
| | Had to push or strain to begin urination? |
| | Had to get up to urinate from the time you went to bed at night until you got up in the morning?<br>For this question, use the following point scale:<br>0 = None 3 = 3 times<br>1 = 1 time 4 = 4 times<br>2 = 2 times 5 = 5 times or more |
| | Total score from all questions |

Your score is an indication of how severe your symptoms are. The symptom index may be used to develop a treatment plan. Your doctor may also ask you to take the test again after treatment to see how successful treatment was in relieving your symptoms. Compare your total score to the list below.

| Score | Severity |
|---|---|
| 0 to 7 | Mild |
| 8 to 19 | Moderate |
| 20 to 35 | Severe |

9. "Routine PSA measurement" in this population has been a source of active debate[9].

- In patients with more severe symptoms or who are being considered for active treatment, urodynamics may be desirable.
- The simplest of these, flowmetry and residual urine volume, are recommended by the International Consultation
- Endoscopic examination of the lower urinary tract should be performed if other lower urinary tract pathology is suspected and is recommended prior to invasive treatment.

## 5. INDICATIONS FOR TREATMENT OF CLINICAL BPH

- Indications for surgery have varied widely over time, and the current climate is much more conservative than what existed 10 to 20 years ago.
- Certain absolute or near absolute indications exist:
    1. Refractory or repeated urinary retention
    2. Azotemia due to BPH
    3. Significant recurrent gross hematuria
    4. Recurrent or residual infection due to BPH
    5. Bladder calculi
    6. A large residual urine
    7. Overflow incontinence
    8. Large bladder diverticula due to BPH.
- Without an absolute or near absolute indication, or combinations of these, the bothersome nature of the symptoms is generally what prompts the patient to request, or the physician to suggest, treatment. Pathologic urodynamic findings may certainly be influential as well.

## 6. MANAGEMENT OF ACUTE URINARY RETENTION

**Presentation**

The patient may complain of increasing dull low abdominal discomfort and the urge to urinate, without having been able to urinate for many hours. A firm, distended bladder can be palpated between the symphysis pubis and umbilicus. Rectal exam may reveal an enlarged and/or tender prostate or suspected tumor. The management will be as follow:

1. **Catheterization:**

- Delay only long enough for good aseptic technique,
- Distend the urethra with lubricant (K-Y jelly, or diluted lidocaine jelly); pass a Foley catheter into the bladder and collect the urine in a closed bag. Reassuring the patient and having him breathe through his mouth may help relax the external sphincter of the bladder and facilitate the passage of the catheter.
- If the problem is negotiating the curve around a large prostate, use a Coude catheter.
- If you still cannot drain the bladder, you may need to use an introducer in the catheter.
- Check renal and urinary function with a urinalysis, a urine culture and serum BUN and creatinine determinations. Examine the patient to ascertain the cause of obstruction.
- If there is an infection of the bladder, give antibiotics.
- If the volume drained is modest (1-2 liters) and the patient stable and ambulatory, attach the Foley catheter to a leg bag and discharge him, for follow-up.
- If the volume drained is small (100-200ml), remove the catheter and search for alternate etiologies of the abdominal mass and urinary urgency.

**What not to do:**

- Do not use introducer or sounds unless you have experience - instrumenting the urethra can cause considerable trauma.
- Do not remove the catheter in the emergency room if the bladder was significantly distended. Bladder tone will take several hours to return, and the bladder may become distended again.
- Do not clamp the catheter to slow decompression of the bladder, even if the volume drained is greater than 2 liters.
- Do not routinely treat the bacteria cultured from a distended bladder--they may only represent colonization which will resolve with drainage.

**2. Emergency (''blind') suprapubic cystostomy, suprapubic puncture**
**CAUTION:**

1. For a blind suprapubic puncture, his bladder must be distended and palpable
2. The classical site for drainage is half-way between his pubis and the upper limit of bladder dullness.
3. If you are going to remove his prostate later, do the cystostomy as high as you can, so that you can open his abdomen below it later, without entering the cystostomy track.

**Contraindication:**

1. Avoid doing a suprapubic cystotomy if you are suspicious the patient has carcinoma of the bladder.
2. If there is a suprapubic scar, you will expect his peritoneum to be adherent to his abdominal wall - you may injure his gut.

**Steps:**

- Infiltrate the site of puncture with local anaesthetic solution in the midline at the chosen site. Continue to infiltrate down to his bladder; when you get there, confirm it is distended by aspirating a few millilitres of urine into the syringe.
- Make a nick in his skin with a scalpel blade.
- With your left hand on the dome of his bladder to steady it, push the trocar into it with a steady turning movement towards his lower sacrum. If his bladder is lax, compress it with the edge of your hand. You will feel it "give' as urine gushes out.
- Push the plastic tube down the cannula long enough until urine will come through the tube and withdraw the cannula
- Secure the tube to his skin with a monofilament stitch tied several times round the tube

**3. Open suprapubic cystostomy**

Indications:
1. Failure of urethral catheterization
2. Contraindication to perform puncture suprapubic cystostomy.

Steps:
1. Make a midline vertical suprapubic incision.
2. A 5 cm incision is adequate unless he is fat. Divide his linea alba, and retract his rectus muscles
3. Use your forefinger, covered with a gauze swab, to push the cellular tissue and peritoneum upwards, away from the anterior surface of his bladder. Dissect the loose fatty tissue away from in front of it.
4. Recognize his bladder by its characteristic pale appearance with some tortuous blood vessels.
5. Insert stay sutures, superiorly and inferiorly, at the proposed ends of your vertical bladder incision. They will make useful retractors when it sinks into his pelvis.
6. Take urine for culture, open his bladder with a longitudinal 5 cm incision, and explore it.
7. Pass a Malecot, de Pezzer, or Foley catheter into his bladder through a separate stab incision above or to the side of the main one. Make it a snug fit and hold it in place with a purse string suture
8. Close the main bladder incision with 2 layers of 2/0 or 1/0 chromic catgut sutures
9. Close the wound in layers leaving retro-pubic drain

## 7. TREATMENT

The aim of treating lower urinary tract symptoms suggestive of BPH should be to relieve symptoms and improve quality of life as well as to attempt to prevent progression of disease and the development of complications. These beneficial effects need to be balanced against the potential side effects of treatment.

### 7.1. Watchful Waiting (Observation)

Patients with only mild symptoms with little impact on quality of life and with no evidence of complications can be managed conservatively. They should be advised about reducing fluid intake and avoiding caffeinated drinks and alcohol [11].

You should advise patients under observation to ask for further medical consultation if their condition deteriorate.

**7.2. Medical Treatment**

**a. Alpha-Adrenergic Antagonists**

Contraction of the prostatic smooth muscle occurs due to activation of the noradrenaline alpha-1 receptors. Inhibiting these receptors relaxes the muscle and decreases urinary outflow resistance, thereby improving symptoms [12].

1) Background:
    i. There are at least three a-1 adrenergic receptor subtypes in human tissues that have been identified by pharmacologic studies and receptor cloning.
    ii. The current nomenclature recognizes a-$l_A$, a-1B, and a-$1_D$.
    iii. All three subtypes have been found in prostatic stromal tissue.
    iv. The a-$1_A$ receptor comprises 60 to 85 percent of the a-1 population.
2) Potential side effects include orthostatic hypotension (said to occur primarily in patients with hypertension), dizziness, fatigue, nasal stuffiness, and ejaculatory disturbances
3) Agents classified according to:
    i. The degree of a-1 receptor selectivity
    ii. Dosing requirements determined by serum half life
4) All of the classic a-1 blockers appear to be very similar in terms of clinical efficacy and safety.
5) The maximal response to alpha blockade occurs within 2 weeks of dose escalation
6) Agents:

    i. Phenoxybenzamine
        1. A nonselective alpha blocker (blocks (a-1 and a-2 receptors)
        2. First agent used to treat BPH.
    ii. Prazosin [13]
        1. Relatively selective a-1 blocker
        2. Requires 3 times daily dosing
    iii. Terazosin/doxazosin [14]
        1. Relatively selective a-1 blockers
        2. Half lives that permit once daily dosing
    **iv.** Tamsulosin [15]
        1. Superselective blocker for the a-1A subtype
        2. Of the three molecularly cloned subtypes of the a-1 receptor, the a-$1_A$ seems responsible for prostate smooth muscle tension
        3. Once daily dosing

**b. 5-α Reductase Inhibitors**

Testosterone is converted to dihydrotestosterone (DHT) by the enzyme 5-alpha reductase within the prostate cell. DHT induces BPH by acting on the prostate tissue [16].
5-alpha reductase inhibitors were developed to decrease the production of DHT and thereby arrest prostatic hyperplasia [16].

1. Finasteride [17]

    i. Competitive selective inhibitor of type II 5 a reductase
    ii. Does not reduce dihydrotesterone DHT levels to castrate values
    iii. Reduces prostatic DHT by 80 to 90 percent
    iv. Does not lower plasma testosterone.
    v. Reduces group mean serum PSA levels by approximately 50 percent, but the effect on individual levels is highly variable
    vi. Approximately 12 percent of patients develop sexual side effects including decreased libido (3.4 to 4.7 percent), ejaculatory disorder (2.7 percent), and impotence (1.7 to 3.7 percent).
    vii. The drug does seem to be effective in the management of BPH-related hematuria.
    viii. The drug is optimally effective in men with prostate volumes over 40 to 50 gm.
    ix. Studies:
        1. Finasteride reduces prostate volume approximately 20 percent
        2. The overall treatment related improvement in symptom score varies from 0.6 units to 2.2 units
        3. Peak flow rate improvement ranges from 0.2 to 1.8 mL/sec
2. Dutestaride [18]
    i. Blocks Type I and Type II 5 $\alpha$ reductase
    ii. Similar efficacy and side effect profile to finasteride

Medical treatment is a suitable for patients with moderate lower urinary tract symptoms. You should stress to the patients that there may be no improvement in symptoms in the first few months and that treatment will be needed for long term. The therapeutic advantage will need to be balanced against the increased side effects and the cost.
In Africa, medical treatment can be advised in patients with high risks to have a surgical procedure, if they can afford the cost. It is also indicated to patients who are younger in age (around 50 years) who are not happy with the potential consequences of surgical intervention e.g. impotence, retrograde ejaculation…… etc. In my practice about 20% of patients with BPH have medical treatment.

**7.3. Different Surgical treatments available**

Removal of the prostate can be accomplished in several different ways. The location of the enlargement within the prostate and the patient's general health will help the urologist determine which of the three following procedures to use. The indications to consider surgical treatment are:

- Recurrent haematuria
- Renal impairment or hydronephrosis
- Recurrent urinary tract infections
- Large residual urine (>200 ml)
- No improvement on medical treatment

**7.3.1. Transurethral resection of the prostate (TURP)**

Transurethral resection is the most common surgery for BPH. In the United States, approximately 200,000 people have TURPs performed each year. After the patient receives anaesthesia, the surgeon inserts an instrument called a resectoscope through the tip of the penis into the urethra. The resectoscope contains a light and valves for controlling irrigating fluid and an electrical loop that cuts tissue and seals blood vessels. With this instrument, obstructive prostate tissue is removed one piece at a time. The removed tissue pieces are carried by the irrigating fluid into the bladder and then flushed out and sent to a pathologist for examination under a microscope. At the end of the procedure, a catheter is placed in the bladder through the penis. The bladder is continuously irrigated with fluid through the catheter in order to monitor bleeding and prevent blood from clotting and obstructing the catheter. Since there are no surgical incisions with this procedure, patients normally stay in the hospital only one to two days. Depending on surgeon preference, the catheter may be removed while the patient is still in the hospital or the patient may be sent home with the catheter in place, attached to a leg bag for convenience and removed several days later as an outpatient procedure. Although TURP is often successful, it has significant drawbacks [19].

1) When prostate tissue is cut away, significant bleeding may occur, which may result in termination of the procedure, blood transfusion, and a prolonged hospital stay.

2) Irrigating fluid may also be absorbed in significant quantities through veins that are cut open, with possible serious sequelae termed transurethral resection syndrome (TUR syndrome). A urinary catheter must be left in place until the bleeding has mostly cleared.

3) The large working sheath combined with the use of electrical energy may also result in stricturing of the urethra

4) The cutting of the prostate also results in a partial resection of the urinary sphincteric mechanism, causing the muscle along the bladder outlet to become weak or incompetent. As a result, when the individual ejaculates, this sphincteric mechanism cannot keep the bladder adequately closed. The ejaculate consequently goes backwards into the bladder (ie, retrograde ejaculation), rather than from the end of the penis.

5) TURP usually requires hospitalization.

6) Also, the nerves associated with erection run along the outer rim of the prostate, and the high-energy current and/or heat generated by such may damage these nerves, resulting in impotence [20].

### 7.3.2. Transurethral incision of the prostate (TUIP)

TUIP actually been in use for many years and, for a long time, was the only alternative to TURP. It may be performed with local anesthesia and sedation. TUIP is suitable for patients with small prostates who suffer from significant obstructive symptoms. Instead of cutting and removing tissue to relieve and for patients unlikely to tolerate TURP well because of other medical conditions. This reduces the pressure of the prostate on the urethra and makes urination easier. Patients normally stay in the hospital one to three days. A catheter is left in the bladder for one to three days after surgery. TUIP is associated with less bleeding and fluid absorption compared to TURP. It is also associated with a lower incidence of retrograde ejaculation and impotence compared to TURP [21].

### 7.3.3. Open prostatectomy

When a transurethral procedure cannot be done, open surgery may be required. Open prostatectomy for BPH is also performed for a prostate that is too large to remove through the penis (more than 75 grams). Other reasons for choosing an open prostatectomy include patients with large bladder diverticula, with large bladder stones and who cannot physically tolerate having their legs placed in stirrups for TURP/TUIP surgery.

An incision is made in the abdominal wall from below the belly button to the pubic bone. The prostate gland can then be removed in its entirety through either an incision in the fibrous capsule surrounding the prostate (retropubic prostatectomy) or through an incision made in the bladder (suprapubic prostatectomy). Both procedures are done extraperitoneally. Postoperative pain is mild to moderate. Patients usually stay in the hospital for several days and go home with a urinary catheter. In some cases a second catheter draining the bladder through the lower abdominal wall is used. Open prostatectomy usually has an excellent outcome in terms of improvement of urinary flow and urinary symptoms [22, 23].

## 8. RESULTS

**What can be expected after treatment?**

Postoperatively, patients typically experience significant improvement in their symptoms (Table 1). As with any operative procedure, complications do exist. Some occur in the early postoperative period (Table 2) while others may occur many years later (Table 3).

**Table 1**: Overall improvement in patient symptoms

| TURP | TUIP | Open |
|---|---|---|
| 88% | 80% | 98% |

**Table 2**: Immediate post-operative complications

| | TURP | TUIP | Open |
|---|---|---|---|
| Infection | 15% | 13% | 20% |
| Bleeding requiring transfusion | 5-10% | 1% | 8% |

| | | | |
|---|---|---|---|
| Impotence | 14% | 12% | 17% |
| Retrograde ejaculation | 73% | 25% | 77% |
| Incontinence | 1% | <1% | <1% |

**Table 3**: Late post-operative complications

| | TURP | TUIP | Open |
|---|---|---|---|
| Stricture and bladder neck contracture (scar tissue causing obstruction) | 4% | 3% | 4% |
| Additional surgery within 5 years | 10% | 9% | 2% |

## 9. NEW MINIMALLY INVASIVE PROCEDURES FOR BPH

Urologists have been trying to develop other therapies to decrease the amount of obstructing prostate tissue while avoiding the above-mentioned adverse effects associated with TURP. These therapies are collectively called minimally invasive therapies. Most minimally invasive therapies rely on heat to cause destruction of prostatic tissue; however, this heat is delivered in a limited and controlled fashion with the hope that the complications associated with TURP may be avoided. They also allow for the use of milder forms of anesthesia, which translates into less anesthetic risk for the patient. Heat may be delivered in the form of laser [24]energy, microwaves, radiofrequency energy, high-intensity ultrasound waves, and high-voltage electrical energy. Delivery devices are usually similarly passed through a working sheath placed in the urethra, although they are usually of a smaller size than that needed for TURP. Devices may also simply be attached or incorporated into a urinary catheter or passed through the rectum, from which the prostate may also be accessed. Keep in mind that many of these minimally invasive therapies are undergoing constant improvements and refinements resulting in increased efficacy and safety. Ask urologists about the specifics of the minimally invasive therapies that they use and what results they have experienced.

### 9.1. Lasers deliver heat to the prostate in a variety of ways.

1. They may be used to directly evaporate, ie, melt away prostate tissue. They may also be used in a manner in which the laser is not actually in direct contact with the prostate but delivers heat energy into the prostate, resulting in cell death of the prostate tissue. Laser fibers may first be placed directly into the prostate tissue and then turned on, releasing energy into the tissue. All these laser treatments essentially cause thermal destruction of prostate tissue (coagulation necrosis). Over time, this destroyed tissue then contracts, with resultant decreased prostatic volume.
2. Lasers may be used in a knifelike fashion to directly cut away prostate tissue, similar to a TURP procedure [25].
3. Laser treatment usually results in decreased bleeding, fluid absorption, length of hospital stay, and incidence of impotence and retrograde ejaculation when compared to standard TURP; however, in patients in whom lasers are used for thermal destruction (coagulation necrosis), they may cause significant swelling of the prostate, resulting in prolonged catheterization after the procedure. Additionally, because treating tissue with a laser involves a time interval during which dead cells slough and healing follows, patients

may experience urinary urgency or an irritation, resulting in frequent or uncomfortable urination for some weeks [26].
4. The results of laser therapy are variable in that many lasers are being used in many different ways. They usually bring about more relief of urinary symptoms than treatment with medicines, but not quite as much as provided by a TURP procedure.
5. A laser treatment in which the laser is used to excise prostate tissue like a knife (in a fashion similar to TURP) has recently been shown to be as effective as TURP.

**9.2. The use of microwave energy, termed transurethral microwave therapy (TUMT)**
1. It delivers heat to the prostate via a urethral catheter or a transrectal route.
2. The surface closest to the probe (the rectal or urethral surface) is cooled to prevent injury. The heat causes cell death, with subsequent tissue contraction, thereby decreasing prostatic volume.
3. TUMT can be performed in the outpatient setting with local anesthesia.
4. Microwave treatment appears to be associated with significant prostatic swelling; a considerable number of patients require replacement of a urinary catheter until the swelling somewhat subsides. In terms of efficacy, TUMT scores between medical therapy and TURP [27, 28].

**9.3. Transurethral needle ablation of the prostate (TUNA)**
It involves using high-frequency radio waves to produce heat, resulting in a similar process of thermal injury to the prostate as previously described. A specially designed transurethral device with needles is used to deliver the energy.
TUNA can be performed under local anesthesia, allowing the patient to go home the same day.
Similar to microwave treatment, radiofrequency treatment is quite popular, and a number of urologists have experience with its use.
Radiofrequency treatment appears to reliably result in significant relief of symptoms and better urine flow, although not quite to the extent achieved with TURP [29].

**9.4. High-intensity focused ultrasound (HIFU)**
It delivers heat to prostate tissue, with the subsequent process of thermal injury.
High-intensity ultrasound waves may be delivered rectally or extracorporeally and can be used with the patient on intravenous sedation.
Urinary retention appears to be common with its use.
High-intensity ultrasound energy also produces moderate results in terms of improvement of the urinary flow rate and urinary symptoms, although its use is now relatively limited compared to the more popular TUNA and TUMT [30, 31].

**9.5. Water-induced thermotherapy**
It is a relatively new procedure in which heated water is circulated through a balloon in the prostatic urethra, thus initiating a process of thermal destruction of prostate tissue.

1. Only local anesthesia is needed.

2. Further analysis of outcomes of patients treated with this procedure is needed before an assessment of its efficacy and its place in the treatment of BPH can be determined. Optimal results may not be apparent for 3-4 months after the procedure [32].

### 9.6. Transurethral ethanol ablation of the prostate (TEAP)

1. The procedure is performed under visual control. The choice of Ethanol is considered as the best choice among others injectants.
2. The technique of injection spares the bladder neck and the trigone in order to avoid serious adverse event such as bladder necrosis
3. This procedure combines several advantages: safety, efficacy, rapidity, simplicity and cost effectivness as demonstrated by the multicentric European Study [33].

### 9.7. Mechanical approaches

Mechanical approaches are used less commonly and are usually reserved for patients who cannot have a formal surgical procedure. Mechanical approaches do not involve the use of energy to treat the prostate.

1. **Prostatic stents** are flexible devices that can expand when put in place to improve the flow of urine past the prostate. Their use has been associated with encrustation, pain, incontinence, and overgrowth of tissue through the stent, possibly making their removal quite difficult. To date, their full role and long-term effects are not fully known.
2. **Balloon dilation** involves transurethral placement of a balloon, which is then inflated with the intent of expanding the prostatic urethra. Balloon dilation has been abandoned. Efficacy has not been demonstrated with this procedure [34]

In our set up in Africa, minimal invasive procedures are not available because of the cost involved despite their advantages and less complications. I have an experience with TEAP in Zambia which can be done in our setup[35].

## 10. RECOMMENDATIONS

1. Designing appropriate training programs in the region with the aim of producing competent surgeons who are able to perform prostate surgery with minimal supervision and few complications.
2. Establishing uniform protocols for accurate reporting of results.
3. Uniform guidelines and standards for performing these operations using the facilities and expertise available in the region should be formulated and promoted by the regional and national surgical bodies. ASEA and COSECSA have already taken general steps in this direction.
4. The indications and extent of surgery for benign prostatic hyperplasia in the third world should not necessarily be the same with the developed countries, considering our unique environments, cultures and concepts of disease processes.
5. The main management of BPH in our environment where there are not enough urologists is open surgery.

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