BENIGN PROSTATIC HYPERPLASIA

Prostatic Adenoma, Benign Prostatic Hypertrophy, Enlargement Of The Prostate, Bep, Bpe, Bph, Bhp

A noncancerous increase in size of the prostate.

Diagnosis  Male

Related Diagnoses:
Varicocele  Azoospermia  Anejaculation  Retrograde ejaculation

About Benign prostatic hyperplasia

Benign prostatic hyperplasia (BPH; Pic. 1) is characterized by increased size of the prostate leading to difficulties with passing the urine. The cells of prostate may increase in numbers (hyperplasia) or in size (hypertrophy) resulting in larger size of prostate. As result, prostatic nodules form in the transition zone of the prostate, which is the area where the prostate is surrounding the urethra. This is eventually leading to increased pressure to the urethra which becomes compressed so there is a flow repulse. Therefore, the bladder has to make greater work effort during voiding, possibly leading to progressive hyperthrophy, instability, or weakness (atony) of the bladder muscle.

Benign prostatic hyperplasia (BPH) is a common urological disorder in men. Its prevalence increases with age and may affect 3 of 4 men in their sixties. BPH may cause gradual obstruction to the bladder outflow, leading to progressive severity in lower urinary tract symptoms (LUTS) such as frequency, urgency, nocturia (discontinuous sleep due to voiding), incomplete voiding and weak urinary stream.

The negative impact which androgens (male sex hormones) might have on prostate growth is well known. With better understanding of this disease new factors influencing its development have arisen. Inflammation, growth factors (chemical substance inducing cellular growth), stromal interactions, and genetic factors have all been shown to contribute to the hyperplasia of the prostate glands and stroma.

The following factors are known to take part in BPH development:

Androgens

The androgens besides prostate differentiation, take another biological action in the prostate which is the promotion of growth, which is essentially orchestrated in three distinct waves. The first growth wave is completed at birth, when the average weight of the prostate is about 1.5 grams. Prostatic development at this stage is a clear function of androgen signaling and is dependent on the function of the fetal testis. After a quiescent phase, at puberty—under the influence of increasing testosterone—the second wave starts: the prostate size reaches approximately 10 grams at early puberty and almost double that around the age of twenty. Thereafter, the size of the prostate remains constant until mid-late adulthood. At that time, in contrast to the pubertal growth phase which involves the entire gland, often there is a third selective growth phase, involving one of the three anatomically distinct prostate zones, the periurethral one, and which gives rise to BPH. It is obvious, that any condition leading to hormonal imbalance and elevated androgen levels may cause BHP.

Inflammation

Chronic inflammation is a crucial component of BPH pathogenesis. Through a series of reaction between prostatic cells and immunity system the hyperplasia of prostatic cells may be induced. There is also a possible
link between to metabolic aspect and chronic inflammation. It seems that insulin and low density lipids may also evoke an inflammatory reaction in prostatic cells.

Metabolic syndrome

Metabolic syndrome (MS) is characterized by specific factors such as hypertension, obesity, high insulin, and low high density lipids (HDL) - cholesterol levels. It has been proven, that all of these factors are also risk factors for the development of BPH. Each individual factor of MS has been associated in some study with BPH/LUTS (lower urinary tract symptoms) prevalence or progression, although it has been noted that their clustering, more than their individual presence, underlies the link.

Insulin is an independent risk factor for BPH, most probably stimulating prostate growth acting on IGF (insulin-like growth factor) receptors. The obesity is evaluated by BMI (body mass index). There is also connection between high BMI and LUTS associated with BPH. The impact of obesity on prostate size is apparent even in early adulthood.

Genetics

Much of the current research has focused on the gene expression (the synthesis of pretins based upon the genetic information) that differs between individuals, particularly around cellular pathways and receptors. The enzyme 5-alpha reductase 2 (5AR2) plays a key role in the conversion of androgens in the prostate, leading to hyperplasia. This means that genetic alterations affecting prostatic cell components may result in BHP.

The clinical diagnosis of BHP is based upon a history of LUTS, a digital rectal exam, and exclusion of other causes. The degree of LUTS does not necessarily correspond to the size of the prostate. So far the most precise and effective examination is the transrectal ultrasonography. Rectal examination (palpation of the prostate through the rectum) may reveal a markedly enlarged prostate, usually affecting the middle lobe. Blood tests are often performed to rule out prostatic malignancy. Ultrasound examination of the testicles, prostate, and kidneys is often performed, again to rule out malignancy.

The treatment of BHP is most often based upon administration of specific medicaments to help relax the prostate smooth muscles and ease the pressure on the urethra. If the prostate is too large, an open operation is performed. Novel techniques include the usage of laser surgery or even surgery. The surgical intervention involves trans-urethral resection of the prostate (TURP). There is also a way to improve BHP by self-administration of specific herbal medicaments. In this case, the pumpkin seed oil extract seems to effectively improve BHP.

Associated diseases

- retrograde ejaculation
- azoosperma
- varicocele
- abnormal semen pH
- anejaculation

Complications

Prostate cancer

As explained before, BPH is connected with local chronic inflammation. New theories suggest, that inflammation leads to progressive failure of the immune system leading to decreased immune surveillance and development of prostate cancer.

Risk factors

- diabetes
- obesity
- metabolic syndrome
- hypertension
- obesity
- high insulin
- low high density lipids (HDL) - cholesterol levels
- ageing (raising levels of androgens due to age promoting prostate growth)
- insulin resistance
Impact on fertility

The impact of BHP to fertility is accordant to its causes. The metabolic syndrome affects not only the prostate but also the sperm production and sperm quality. Various studies showed that standard sperm qualities such as motility, morphology and concentration are deteriorated due to obesity. Hormonal changes induced by metabolism alterations may also affect the function of reproductive system. The local inflammation of prostate usually leads to increased concentration of reactive oxygen species (ROS; highly reactive chemicals containing oxygen) in prostatic fluid ejected into the ejaculate. The high concentration of ROS in the ejaculate negatively influences the quality of sperm cells. BHP is also connected with sexual dysfunction e.g. erectile dysfunction.

Another important factor of BHP influence on fertility is its treatment, which often involves surgical solution. Up to half of the cases of the surgical interventions within the prostate negatively affect the function of bladder sphincter, leading to retrograde ejaculation (ejaculation of the semen into the bladder). Malfunctioning bladder sphincter is not closed during ejaculation so the sperm cells flow into bladder instead of normal passage through penile urethra. This causes infertility in men.

Prevention

There is no proven way to prevent BHP, yet it seems, there are some ways to postpone its development. As the BHP is closely related to metabolic conditions and physical state of the body, the active lifestyle and healthy alimentation may slow the growth of prostate.

Symptoms

The symptoms of BPH are collectively referred to as lower urinary tract symptoms (LUTS). They are result of reduced urinary flow and include following:

- increased urgency of urination
- painful urination
- incomplete voiding
- increased frequency of urination
- poor stream
- excessive passage of urine at night
- hesitancy (worsened if bladder is very full)
- overflow incontinence (occurs in chronic retention)

The evaluation symptoms and the bother associated with it are important for management. International Prostate Symptom Score (IPSS; a questionnaire regarding symptoms and quality of life of a patient), Quality of life (QOL; assessment of general well-being of an individual) and Benign Prostatic Hyperplasia Impact Index (BII; assessment of LUTS on patient’s health and functioning) are practiced to quantify the severity of the disease.

Therapies

Self therapy

Herbal medicine

Herbal medicine is commonly used to treat BPH. Saw palmetto extract from Serenoa repens is one of the most commonly used and studied, having shown some promise in early studies. Other herbal medicines include beta-sitosterol from Hypoxis rooperi (African star grass) and pygeum (extracted from the bark of Prunus africana), pumpkin seed (Cucurbita pepo) and stinging nettle (Urtica dioica) root. Recent studies suggest that most of the popular herbal remedies have been shown to be no more efficient than placebo. On the other hand, there is also a study aimed on usage of pumpkin seed oil extract. This study
has proven some beneficial effects such as anti-androgenic, anti-inflammatory, antioxidant, antiproliferative and diuretic properties.

## Conventional medicine

### Pharmacotherapy

#### Alpha blockers

Alpha-blockers, which cause relaxation of the smooth muscle fibres within the prostate, continue to be the first-line treatment.

#### 5-alpha reductase inhibitors

An alternative medication group are the 5-alpha reductase inhibitors. Large multi-centre randomised controlled trials have shown the benefit of these medications in improving urinary symptoms.

#### Phosphodiesterase type 5 (PDE5) inhibitors

The only new medications on the market for BPH in the last few years have been the phosphodiesterase type 5 (PDE5) inhibitors, trials have shown improvement in BPH symptoms without adverse sexual side effects. The exact mechanism for the effect for symptomatic BPH still has not been elucidated.

### Surgery

TURP (trans-urethral resection of the prostate) has long been the standard of care for the surgery of BPH unless the prostate was very large and in that case an open operation was performed. The goal with technology has been to improve upon these techniques to provide better outcomes with less morbidity. In 2015, the surgical options open to a patient are many, including traditional surgery, laser surgery, and in some cases robotic surgery.

Lasers have been used in endoscopic BPH surgery for over 20 years. The unique properties of each laser and its individual wavelength allow precise cutting and vaporisation of tissue with excellent haemostasis.

From a surgical point of view, most procedures result in retrograde ejaculation, which can affect both fertility and sexual performance/satisfaction.

### Others

#### Prostatic artery embolization

A more controversial new technique with only relatively recent published data is prostatic artery embolization. Performed by an interventional radiologist rather than a urologist, this technique is performed under local anaesthetic and involves a groin artery puncture with vascular embolization of the arteries to the prostate. This is postulated to cause shrinkage of the prostate and an improvement in urinary function.

#### Prostatic urethral lift

The most promising new technique has been the prostatic urethral lift. This is a novel mechanical implant placed into the prostate that pulls the encroaching lobes of the prostate out of the way to improve men’s flow.

## Assisted reproduction
Even after the means of conventional medicine are employed, the fertility may still be reduced. Especially in case of surgical intervention, there is a high probability of reduced fertility potential due to retrograde ejaculation. If such complication should resume even after BHP treatment, the assisted reproduction technique may represent the only option to conceive a child.

Assisted reproductive technology (ART) is the technology used to achieve pregnancy in procedures such as fertility medication, artificial insemination, in vitro fertilization and surrogacy. It is reproductive technology used primarily for infertility treatments, and is also known as fertility treatment.

If a man is experiencing infertility as a result of BHP treatment and consequential retrograde menstruation, the male’s urine with ejaculate may be centrifuged and the isolated sperm injected directly into the woman’s oocyte during ICSI procedure. This procedure involves the injection of single sperm cell directly into the oocyte by microneedle. Fertilized oocyte is then cultivated to a certain stage of development and inserted into a uterus.

In more severe cases, where are no sperm present in collected samples, surgical retrieval methods (TESE, micro TESE, etc.) may be used. These methods involve surgical retrieval of a sperm cell from testicles. The technique like microsurgical epididymal sperm aspiration (MESA), percutaneous epididymal sperm aspiration (PESA) can be used to obtained from epididymis. The testicular sperm extraction (TESE) is used to remove small part of testicular tissue containing sperm cells. Testicular sperm aspiration (TESA) is kind of a similar technique which extracts just fluids containing living sperm cells from the testicle. The sperm retrieval is followed by iSCF procedure afterwards.

If even these procedures fail to success, there is still the possibility of using donated sperm. The donor of sperm must undergo series of tests and examination to ensure the healthiness of retrieved sample which is stored afterwards within liquid nitrogen (cryopreservation). Thanks to great advance of cryopreservation technique, the fertilization capacity and quality of stored sperm is maintained at high level and now days there is a quite large list of donor from which the patient may choose.

---

**Find more about related issues**

**Diagnoses**

**Varicocele**
An abnormal enlargement of the pampiniform venous plexus in the scrotum.
Learn more at: [www.fertilitypedia.org/therapy/diag/varicocele](http://www.fertilitypedia.org/therapy/diag/varicocele)

**Azoospermia**
Complete absence of sperm in the ejaculate of a man.
Learn more at: [www.fertilitypedia.org/therapy/diag/azoospermia](http://www.fertilitypedia.org/therapy/diag/azoospermia)

**Anejaculation**
The pathological inability to ejaculate in males, with (orgasmic) or without (anorgasmic) orgasm.
Learn more at: [www.fertilitypedia.org/therapy/diag/anejaculation](http://www.fertilitypedia.org/therapy/diag/anejaculation)

**Retrograde ejaculation**
The semen, which would normally be ejaculated via the urethra, is redirected to the urinary bladder.
Learn more at: [www.fertilitypedia.org/therapy/diag/retrograde-ejaculation](http://www.fertilitypedia.org/therapy/diag/retrograde-ejaculation)

**Symptoms**

**Painful urination**
A burning or stinging sensation during urination.
Learn more at: [www.fertilitypedia.org/edu/symptoms/painful-urination-1](http://www.fertilitypedia.org/edu/symptoms/painful-urination-1)

---

**Therapies**
Egg donation
Process by which a woman donates eggs for purposes of assisted reproduction or biomedical research.
Learn more at: www.fertilitypedia.edu/therapies/egg-donation

ICSI
A micromanipulative fertilization technique in which a single sperm is injected directly into an egg.
Learn more at: www.fertilitypedia.edu/therapies/icsi

Sperm donation
The procedure in which a man (sperm donor) provides his sperm for fertility treatment.
Learn more at: www.fertilitypedia.edu/therapies/sperm-donation

Standard IVF
A process in which an egg is fertilised by sperm outside the body: in vitro. Own or donated gametes may be used.
Learn more at: www.fertilitypedia.edu/therapies/standard-ivf

Gallery

Pic
The pressure of growing prostatic tissue on the urethra cause the lower urinary tract symptoms (LUTS).

Sources

" Impact of obesity on male fertility, sperm function and molecular composition [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3521747/]
—by Palmer et al. licensed under CC BY-NC 3.0


" Benign prostatic hyperplasia is a significant risk factor for bladder cancer in diabetic patients: a population-based cohort study using the National Health Insurance in Taiwan [https://bmccancer.biomedcentral.com/articles/10.1186/1471-2407-13-7] —by Tseng licensed under CC BY 2.0

" Recent advances in treatment for Benign Prostatic Hyperplasia [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4754003/] —by van Rij and Gilling licensed under CC BY 4.0


" Benign Prostatic Hyperplasia: A New Metabolic Disease of the Aging Male and Its Correlation with Sexual Dysfunctions [https://www.hindawi.com/journals/iije/2014/329456/] —by Corona et al. licensed under CC BY 3.0
