

Benign prostatic hyperplasia

Benign prostatic hyperplasia (BPH) is a non-malignant enlargement of the prostate based on the proliferation of mainly stromal cells. It is the most common benign tumor in men and its prevalence increases with age. At the age of sixty, more than 60% of men have clinical symptoms of BPH.^[1]

Anatomy of the prostate

The prostate is a muscle-glandular organ that contains tuboalveolar glands in a fibromuscular stroma. The glands open into the prostatic urethra and produce 0.5 ml of secretion. This secretion contains citrates (ensures sperm mobility), nourishes sperm, has a high content of zinc (with an antimicrobial effect).

Morphological arrangement - the so-called zonal concept:

- **anterior fibromuscular stroma** (33% of volume),
- **peripheral zone** (70% of the glandular part),
- **central zone** (25%, comes from the Wolff duct),
- **"periprostatic" urethral zone** (3% of the glandular part),
- **transit (transitional) zone** (2%).

Zones 1–3 arise from the urogenital sinus (endoderm). The periurethral glands are located inside the internal sphincter. Glands that are distal can expand more (they are not prevented by the sphincter) and form the so-called *transient zone*.

It is in the periurethral and transient zone that benign nodules (future lateral lobes of hyperplasia) begin to form around the age of 40. Periurethral nodules have the character of stroma, nodules in the transient zone are glandular.

Stages of BPH progress

Pathological stage - the beginnings of histological changes

- period of microscopic changes (30-50 years);
- period of macroscopic changes.

Clinical stage - prostatism

The growth of BPH is characterized by the formation of nodules, diffuse hyperplasia of the transient zone and enlargement of the nodules. The surrounding prostatic tissue is slowly moved peripherally and forms the so-called surgical sheath.

Etiology

The main factors are older age and the presence of androgens (functional testicles).

With increasing age, the level of dihydrotestosterone (DHT) remains normal, after the age of 60 it tends to decrease, but the amount of estrogen gradually increases. It is believed that the receptors for DHT are expressed to an increased extent precisely under the influence of estrogens, which leads to an increased binding of DHT, and thus **prostate growth stimulation** occurs.^[2]

Pathogenesis

Obstruction consists of two components - *mechanical* (passive compression of the urethra) and *dynamic* (depends on the tone of the prostatic smooth muscles). Long-term obstruction leads to hypertrophy of the detrusor, so-called trabecularization (macroscopically visible hypertrophic bundles), formation of pseudo-diverticulae and true diverticulae occurs. When the detrusor is exhausted, there is a residue with bladder dilatation, compression of the ureters with reflux, urinary tract infection (UTI) to chronic renal insufficiency (CHRI).

Clinical picture

Only about 10-25% of men with BPH are indicated for surgery. There is no correlation between prostate size and degree of obstruction. The set of symptoms is sometimes called **prostatism**. The **irritant symptoms** of BPH include: polakiuria, imperative micturition, nocturia, urgent incontinence and pain behind the pubic clasp. They are most likely caused by the detrusor reaction to the obstruction. **Obstructive symptoms** of BPH are caused by mechanical narrowing of the urethra. These include retardation of the start of urination, urination with increased effort, interrupted and prolonged micturition, thinning of the stream, post-evacuation incontinence and the formation of urinary residue or retention.

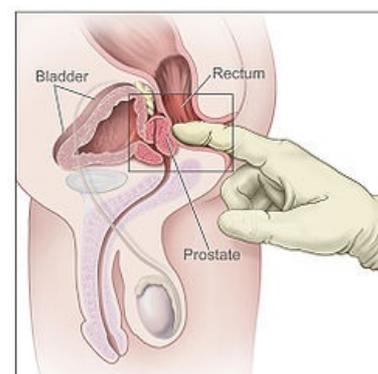
Predictors of BPH progression are higher prostate-specific antigen (PSA), larger prostate volume and the presence of inflammatory changes in the prostatic tissue.^[1] The symptom score is determined based on the answers to 7 questions (I-PSS score):

- feeling of complete emptying,
- micturition frequency,
- nocturia,
- urinary stream strength,
- delayed onset of micturition,
- interrupted urination,
- emergency

Each item is rated on 6 levels (0–5), then the items are added together.

Diagnosis

- per rectum – prostate enlarged, smooth surface, elastic, circumscribed, painless;
- determination of post-micturition urinary residue (by tapping, bimanually – counter-pressure with a finger inserted per rectum);
- USG – suprapubic or rectal probe;
- urine examination – IMC is a frequent complication;
- cystourethrography, IVU, uroflowmetry, cystometry, PSA.



Prostate examination per rectum

Differential diagnosis

Prostate cancer (PSA, rectal USG, puncture), urethral sclerosis, prostatitis.

Treatment

Only part of the patients with symptoms of BPH require treatment, we can only monitor asymptomatic patients. ^[1]

Pharmacological treatment

The most common medical treatment is **the administration of α -blockers** (alfuzosin), which have a rapid onset of action and some of them can also favorably influence clinical progression BHP. Patients with heavier prostates benefit from treatment with **inhibitors of 5- α reductases**, which significantly reduce the risk of urinary retention and the need for subsequent surgical treatment. Another possibility is the combined treatment of α -blockers with 5- α inhibitors. reductase. Patients with symptoms of irritable bladder can be treated with a combination of α -blockers and anticholinergics. Phytotherapy is a widely used method, although its therapeutic effects have not been unequivocally proven by controlled clinical studies. ^[1]

α -blockers (uroselective α_1 -adrenergic antagonists)

- in the periprostatic part there are many α receptors, the stimulation of which increases the tone of smooth muscles;
- α -blockers occupy these receptors, thereby widening the lumen of the prostatic part of the urethra, thereby reducing the outflow resistance of the urethra and improving micturition;
- examples: alfuzosin, doxazosin, tamsulosin, terazosin;
- NÚ: hypotension, affecting the cardiovascular system (CVD) (α -blockers were originally developed as antihypertensives).

Inhibitors of 5- α reductases

- enzyme 5- α -reductase enables the conversion of testosterone to dihydrotestosterone and as a result of its inhibition, the prostate stops growing, its volume decreases;
- before starting treatment, it is always necessary to check the serum PSA level - this medication reduces the PSA value by half;
- examples: finasteride, dutasteride;
- the greater the mass of the prostate, the greater its transition zone and the higher the initial PSA level, the more pronounced the effect of the treatment;
- NÚ: reduction of libido, erectile dysfunction (reversible within a few weeks after discontinuation of treatment).

Anticholinergics

- spasmolytic effect on the bladder muscles;
- indications: overactive bladder, neurogenic detrusor hyperactivity due to spinal cord injury;
- examples: propiverine, tolterodine.

Phosphodiesterase 5 (PDE5) inhibitors

- isoenzyme PDE5 is in the smooth muscle of the cavernous bodies of the penis and in the transition zone of the prostate;

- example: sildenafil.

Phytotherapeutics

- extracts of dwarf palm (*Serenoa repens*), stinging nettle (*Urtica dioica*), etc.;
- very diverse, difficult to chemically define, pharmacologically non-standard.

Classic surgical treatment

Transurethral resection of the prostate (TURP, sometimes also called transurethral prostatectomy - TUPE;)

- for prostates up to 50 g (larger ones would not be enough, or there would be TUR syndrome);
- indications: failure of medical treatment, acute urinary retention, recurrent uroinfection, presence of cystolithiasis, congestion in the upper urinary tract, repeated hematuria, incipient renal insufficiency^[1].

Open prostatectomy (usually transvesical enucleation of the prostate, possibly retropubic).

Both of these methods have a high surgical burden, blood loss and the risk of retrograde ejaculation.

⚠ In prostatectomy for benign prostatic hyperplasia, we only remove the adenoma, i.e. the benignly changed transitional zone of the prostate. We leave the peripheral zone - the surgical sheath - including the seminal vesicles. Therefore, this operation does not protect the patient from possible prostate cancer arising from the peripheral zone of the prostate.

(Note: Essential for exam.)

Mini invasive treatment

Instrumental

- mainly in younger patients with incipient symptoms;
- transurethral incision of the prostate - two incisions at number 5 and 7, they are led through the surgical sheath from the throat to the seminal colliculus;
- up to 80% causes retrograde ejaculation (sperm goes into the bladder and is later passed out);*transurethral dilatation using a balloon - we insert a catheter with a balloon, inflate it under USG or per rectal control, filling it will tear the prostatic urethra and bladder neck, then we leave the catheter in place for several days;
- intraprostatic stents - self-expanding meshes, spirals...;
- hyperthermia and microwave thermotherapy - they differ according to the temperature (the limit is 45 °C), the heat is generated from microwave radiation emitted from the probes, they are not used much;
- cryoablation.

Surgical

- effort to minimize the surgical load, blood loss, the goal is outpatient performance;
- transurethral electroevaporation - evaporation of tissue with a special electrode;
- interstitial laser coagulation.

Links

Related Articles

- Prostate
- Prostate cancer
- Myoadenoma hyperplasia of the prostate (preparation)

References

1. MUDR. VERNER, Pavel. Současná medikamentózní léčba benigní hyperplazie prostaty. Lékařské listy (příloha Zdravotnických novin). *Medical papers (appendix of Zdravotnické noviny)* [online]. 2009, vol. 6, p. 9-11, Available from <<https://zdravi.euro.cz/clanek/priloha-lekarske-listy/soucasna-medikamentozni-lecba-benigni-hyperplazie-prostaty-413033>>. ISSN 1214-7664.
2. POVÝŠIL, Ctibor - ŠTEINER, Ivo. *Special Pathology*. 2. edition. Prague : Galen, Karolinum, 2007. ISBN 978-80-7262-494-2 (Galen), 80-246-1442-7 (Carolinum).

Source

- BENEŠ, Jiří. *Studijní Materiály* [online]. ©2009. [cit. 2009]. <<http://jirben.wz.cz>>.

References

- TOMÁŠ, . *Urologie pro mediky*. - edition. Charles University in Prague, Karolinum Press, 2015. pp. 306. ISBN 9788024630083.