

The prostate

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Embryology: From the primitive urethra as a series of solid epithelial buds which in a matter of weeks become canalized. Surrounding mesenchyme forms the muscular and connective tissue of the gland and has a major role in differentiation (stromal epithelium interactions).

Surgical anatomy: McNeal classification of the prostate into different zones: the **peripheral zone** (PZ) which lies mainly posteriorly and from which most carcinomas arise, and a **central zone** (CZ) which lies posterior to the urethral lumen and above the ejaculatory ducts as they pass through the prostate. There is also periurethral **transitional zone** (TZ) from which most benign prostatic hyperplasia (BPH) arises. Smooth muscle cells are found throughout the prostate. The glands of the peripheral zone, lined by columnar epithelium, lie in the fibromuscular stroma and their ducts which are long and branched open into posterolateral grooves on either side of **the verumontanum** (common ejaculatory ducts). **Benign prostatic hyperplasia** (BPH) starts in the periurethral transitional zone and as it increases in size it compresses the outer PZ of the prostate which becomes **the false capsule**. There is also the outer **true fibrous anatomical capsule**; and external to this lie condensations of endopelvic fascia known as **the periprostatic sheath** of endo pelvic fascia. Between the anatomical capsule and the prostatic sheath lies the abundant prostatic venous plexus. The prostatic sheath is contiguous with the strong **fascia of Denonvillier** that **separate** the prostate and its coverings from the rectum

Physiology: The prostate has a **sexual function**. The main hormone acting on the prostate is testosterone which is secreted by the Leydig cells of the testes, **Testosterone** is converted to **5-di-hydrotestosterone** (DHT) by the enzyme **5 α -reductase**, which is found in high concentration in the prostate and the perigenital skin. Elaboration and secretion of **prostate-specific antigen** (PSA) and **acid phosphatase**. **PSA** is a glycoprotein which is a serine protease. Its function may be to **facilitate liquefaction of semen**, but it is a marker for prostatic disease. The normal upper limit is about 4 nmol/ml.

Benign prostatic hyperplasia BPH occurs in men over 50 years.

Aetiology; Serum testosterone levels slowly but significantly decrease with advancing age; however, levels of oestrogenic steroids are not decreased equally. According to this theory the prostate enlarges because of increased oestrogenic effects.

Pathology: BPH affects both glandular epithelium and connective tissue stromal to variable degrees. BPH typically affects the submucous group of glands in the transitional zone, forming a nodular enlargement.

Symptoms of 'prostatism or lower urinary tract symptoms (LUTS)

Obstructive / Hesitancy (worsened if the bladder is very full) . Poor flow (unimproved by straining) , Intermittent stream — stops and starts , Dribbling (including after micturition), Sensation of poor bladder emptying , Episodes of near retention

Irritative/ Frequency, Nocturia, Urgency,Urge incontinence,Nocturnal incontinence,(enuresis).

Bladder outflow obstruction: This is a urodynamic concept based on the combination of low flow rates in the presence of high voiding pressures

- Urinary flow rates decrease [for a voided volume >200 ml; a peak flow rate of >15 ml/second is normal , one of 10—15 ml/second equivocal and one <10 ml/second low.

- Voiding pressures increase [pressures >80 cmH₂O are high , pressures between 60 and 80 cmH₂O are equivocal, pressures <60 cmH₂O are normal]

Urodynamically proven bladder outlet obstruction may result from: BPH, bladder neck stenosis , bladder neck hypertrophy, prostate cancer, urethral strictures,functional obstruction due to neuropathic conditions

Assessment of the patient with prostatism

Abdominal examination/ is usually normal. In patients with chronic retention, a distended bladder will be found on palpation.

General physical examination/ may demonstrate signs of chronic renal impairment with anaemia and dehydration. The external urinary meatus

should be examined to exclude stenosis, and the epididymes are palpated for signs of inflammation.

Rectal examination /:In benign enlargement, the posterior surface of the prostate is smooth, convex and typically elastic, The rectal mucosa can be made to move over the prostate.

The nervous system is examined /to eliminate a neurological lesion.

Serum prostate-specific antigen / to exclude prostate cancer . (If this is in excess of 4 nmol/litre)

Flow rate measurement/Blood tests/:Serum creatinine, electrolytes and haemoglobin .**Examination of urine**/,for glucose and blood, a midstream specimen for bacteriological examination and cytological examination

Upper tract imaging/if infection or haematuria, should be imaged by means of an IVU or US.**Cystourethroscopy** / to exclude a urethral stricture, a bladder carcinoma and the occasional non opaque vesical calculus..

Transrectal ultrasound scanning/ increases the rate of detection of associated early prostate cancer .

Management of benign prostatic hyperplasia or bladder outflow obstruction• **Conservative 'watchful waiting'** — general advice about fluid intake, use of anticholinergic medication in men with mild symptoms. •**Drug treatment** to supplement conservative treatment in men with mild symptoms (α-adrenergic blocking agents and 5α-reductase inhibitors)

Strong indications for treatment (usually prostatectomy) include:

1. **Acute & chronic retention**. 2. **Associated with complications** : **stone**, **infection** and **diverticulum**. 3. **haemorrhage**. 4. **elective prostatectomy** for severe symptoms of 'prostatism'.

Conventional operative treatment:/This includes:

- transurethral resection of the prostate (TURP);
- bladder neck incision for the small prostate (<20 g);
- open prostatectomy for the big gland (>—80—100 g).

Methods of performing prostatectomy:The prostate can be approached (1) transurethrally — TURP, (2) retropubically — RPP(Millin), (3) through the bladder (transvesical— TVP) or (4) from the perineum (young). Preliminary vasectomy is now no longer performed.

Transurethral resection of the prostate:/TURP has largely replaced other methods unless diverticulectomy or the removal of large stones

necessitates open operation; over 95 per cent of men being treated by trained urologists can be dealt with by TURP. **Hyponatraemia** is avoided by using 1.5 per cent isotonic glycine for irrigation and the recent introduction of **continuous flow resectoscope** makes the procedure swift and safe in experienced hands. At the end of the procedure, **careful haemostasis is performed and a three-way, self-retaining catheter irrigated with isotonic saline is introduced into the bladder to prevent any further bleeding from forming blood clots.**

Complications: -**Local**/**Haemorrhage** is a major risk following prostatectomy. Secondary haemorrhage tends to occur after the patient has been discharged.

Perforation of the bladder or the prostatic capsule. **Sepsis**, **Wound infection**, **Incontinence**. **Retrograde ejaculation(65%)** and **impotence (5%)**. **Urethral stricture**, this may be secondary to prolonged catheterisations, **Bladder neck contracture**. **Reoperation**.

-**General complications**/**Death** occurs in about 0.2—0.3 per cent, **Cardiovascular**. Pulmonary atelectasis, pneumonia, myocardial infarction, congestive cardiac failure and deep venous thrombosis .

Water intoxication(TUR syndrome). The absorption of water into the circulation at the time of transurethral resection can give rise to congestive cardiac failure, hyponatraemia and haemolysis. Accompanying this there is frequently confusion and other cerebral events often mimicking a stroke. The incidence of this condition has been reduced since the introduction of isotonic glycine for performing the resections and the use of isotonic saline for postoperative irrigation. The treatment consists of fluid restriction.

Newer treatments:/In general, newer, minimally invasive treatments occupy a position intermediate between TURP and drug treatment.

Microwave and **laser treatments** and other methods of tissue destruction

Intraurethral stents