CANADIAN UNDERGRADUATE UROLOGY CURRICULUM

Lower Urinary Tract Symptoms (LUTS) due to Benign Prostate Hyperplasia (BPH)

A Message from CanUUC

This educational material is intended to supplement medical student knowledge on urological health and medical practices. We are committed to promoting inclusion across all our materials. We acknowledge that some language used within this content may include terminology from source materials and research studies, which has been maintained to reflect the scientific context in which information was gathered.

Wherever possible, we aim to use language that is respectful of all individuals, recognizing gender diversity, variations in sex characteristics, and the importance of inclusive terminology.

Learning Objectives

- Define bladder outlet obstruction and its relationship to BPH, as well as its prevalence.
- Review the clinical diagnosis and differential diagnosis of bladder outlet obstruction and the assessment of lower urinary tract symptoms (LUTS).
- Describe a practical approach to the management of BPH in primary care and indications for urological referral.

Clinical Case

- 64-year-old man presents to your GP office with a 2-year history of urinary urgency, frequency, nocturia and slowing of his urinary stream.
- Recently he has felt lower abdominal discomfort, fevers, and extreme difficulty emptying his bladder.
- On exam: looks unwell, lower abdomen is tender and distended, and his flank is tender to percussion.

Clinical Characterization of LUTS

Definition:

- A constellation of obstructive and irritative voiding disturbances of the lower urinary tract.

- LUTS can be classified as bladder storage or sensation problems, and/or voiding or postvoiding problems.

Clinical Characterization of LUTS

Storage Symptoms

- **F**requency
- **U**rgency
- **U**rge Incontinence
- **N**octuria
- **D**ysuria

FUND

Emptying Symptoms

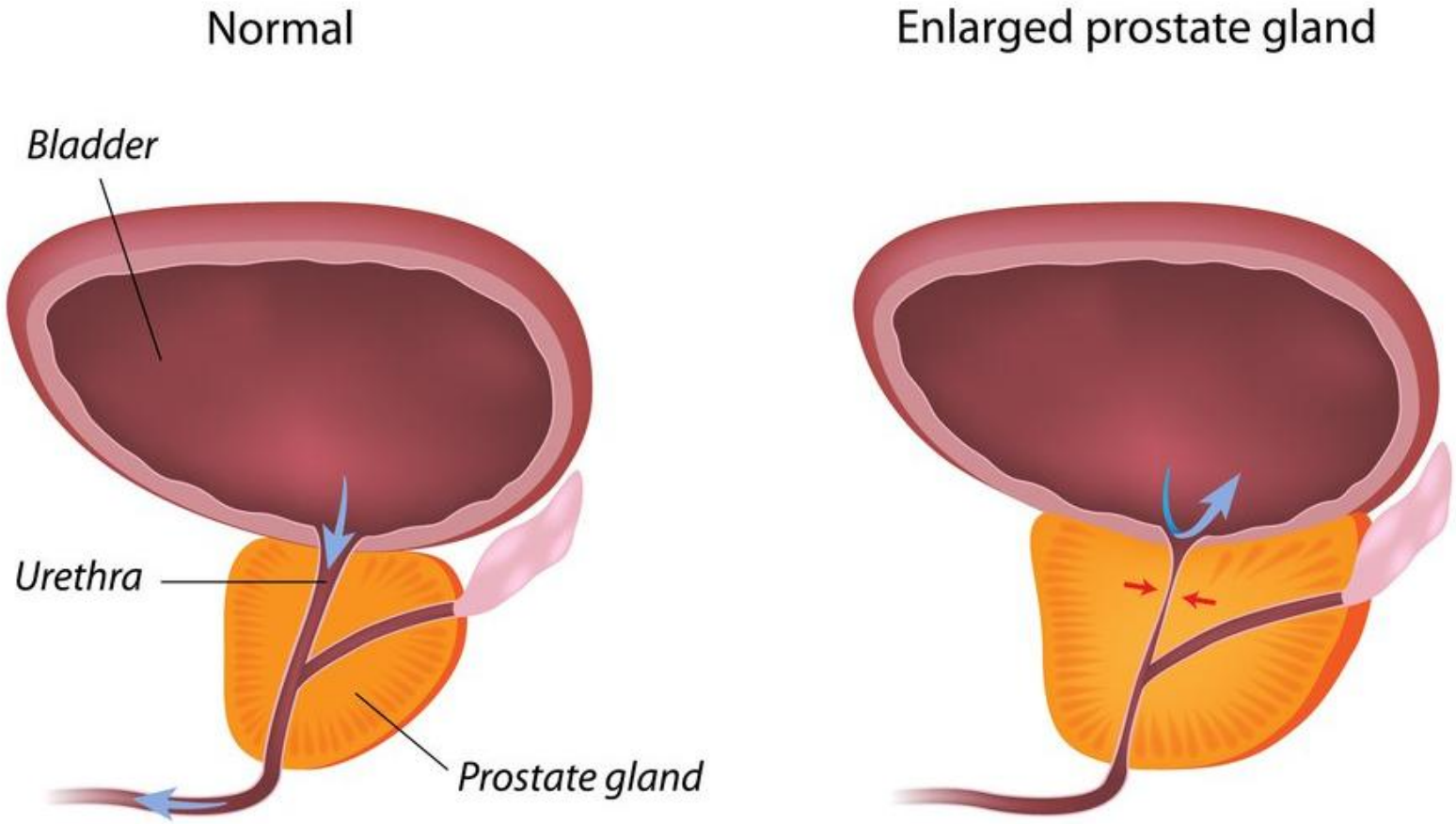
- **W**eak Stream
- **I**ntermittency
- **S**training
- **E**mptying feels incomplete

WISE

Differential Diagnosis of LUTS

- **Prostate:** BPH, prostate cancer, prostatitis
- **Bladder:** cystitis, bladder tumor, bladder or ureteric stone, overactive bladder
- **Urethra:** urethral stricture, urethritis (STI), meatal stenosis, phimosis, foreign body
- **Neurologic:** Parkinson’s disease, stroke, Alzheimer’s disease, spinal cord injury, multiple sclerosis
- **Other:** Obstructive sleep apnea, medication side effect, dietary irritant, external compression from pelvic mass or constipation, polydipsia, congestive heart failure

Evaluation of Lower Urinary Tract Symptoms



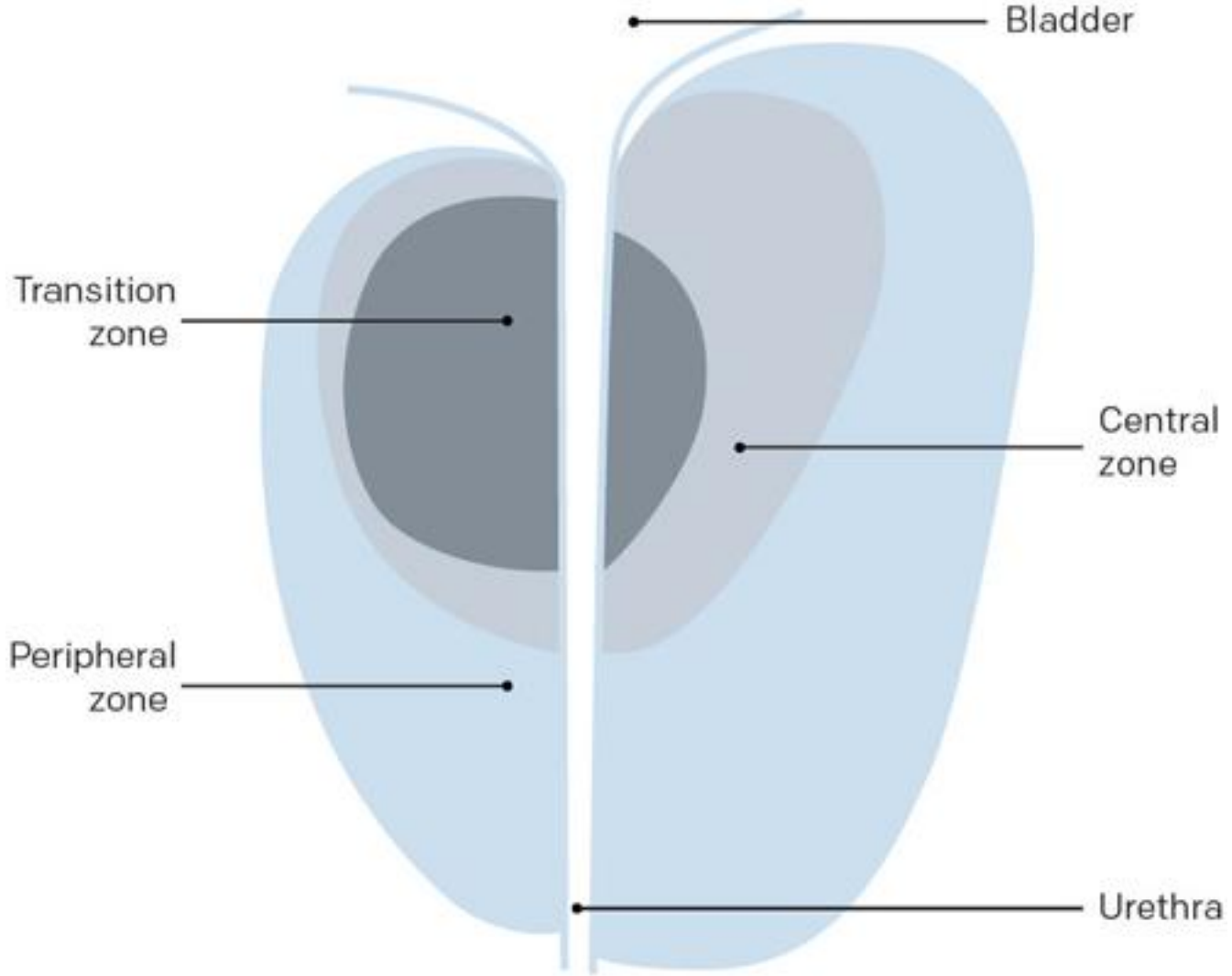
https://assets.nhs.uk/prod/images/CYFPRG.2e16d0ba.fill-920x613.jpg

With a Focus on Bladder Outlet Obstruction due to Benign Prostatic Hyperplasia

What is Benign Prostatic Hyperplasia?

Benign Prostate Hyperplasia (BPH)

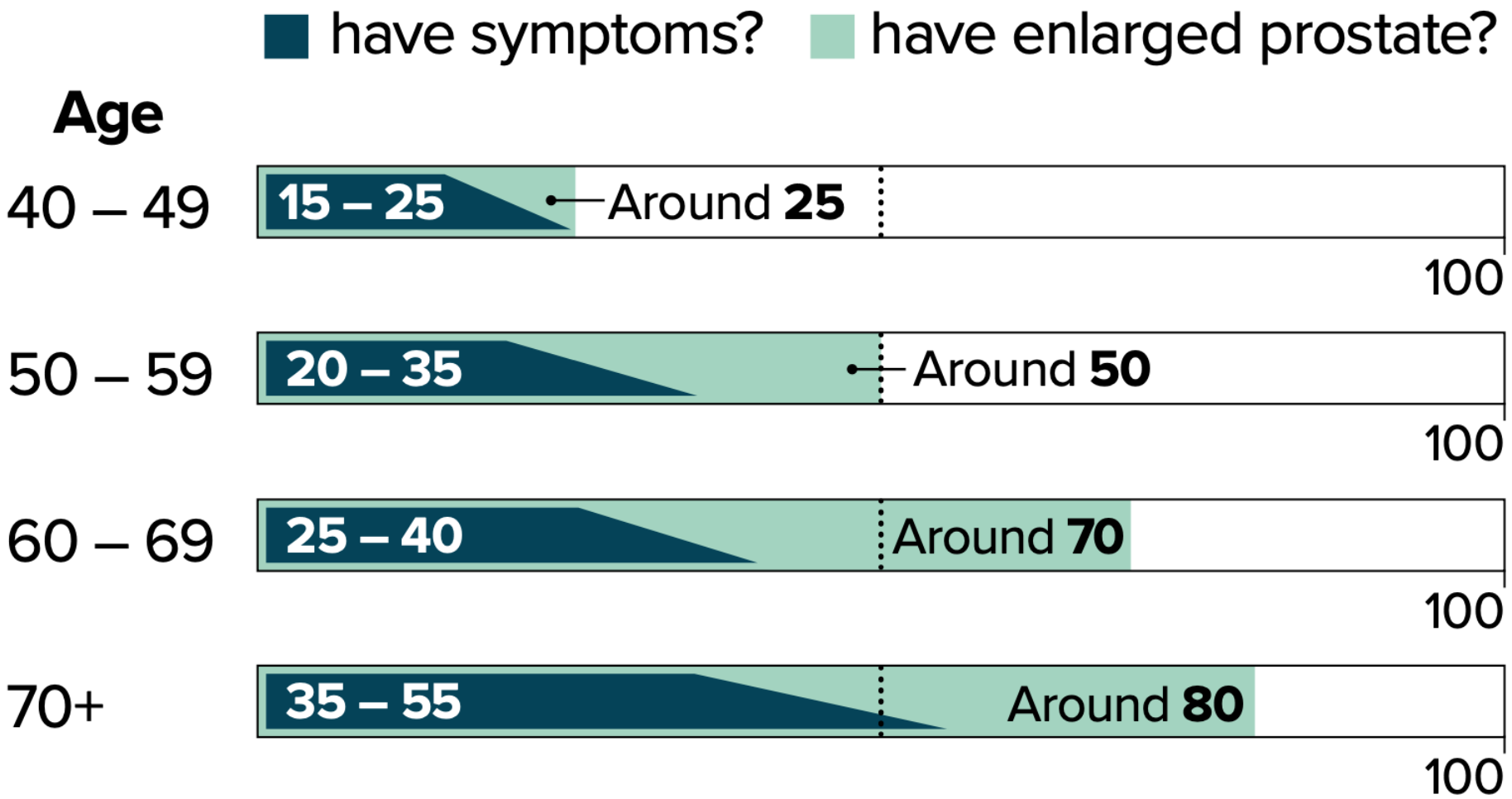
- Proliferation of epithelial and smooth muscle cells
- Within transition zone of prostate
- Changes may lead to outlet obstruction



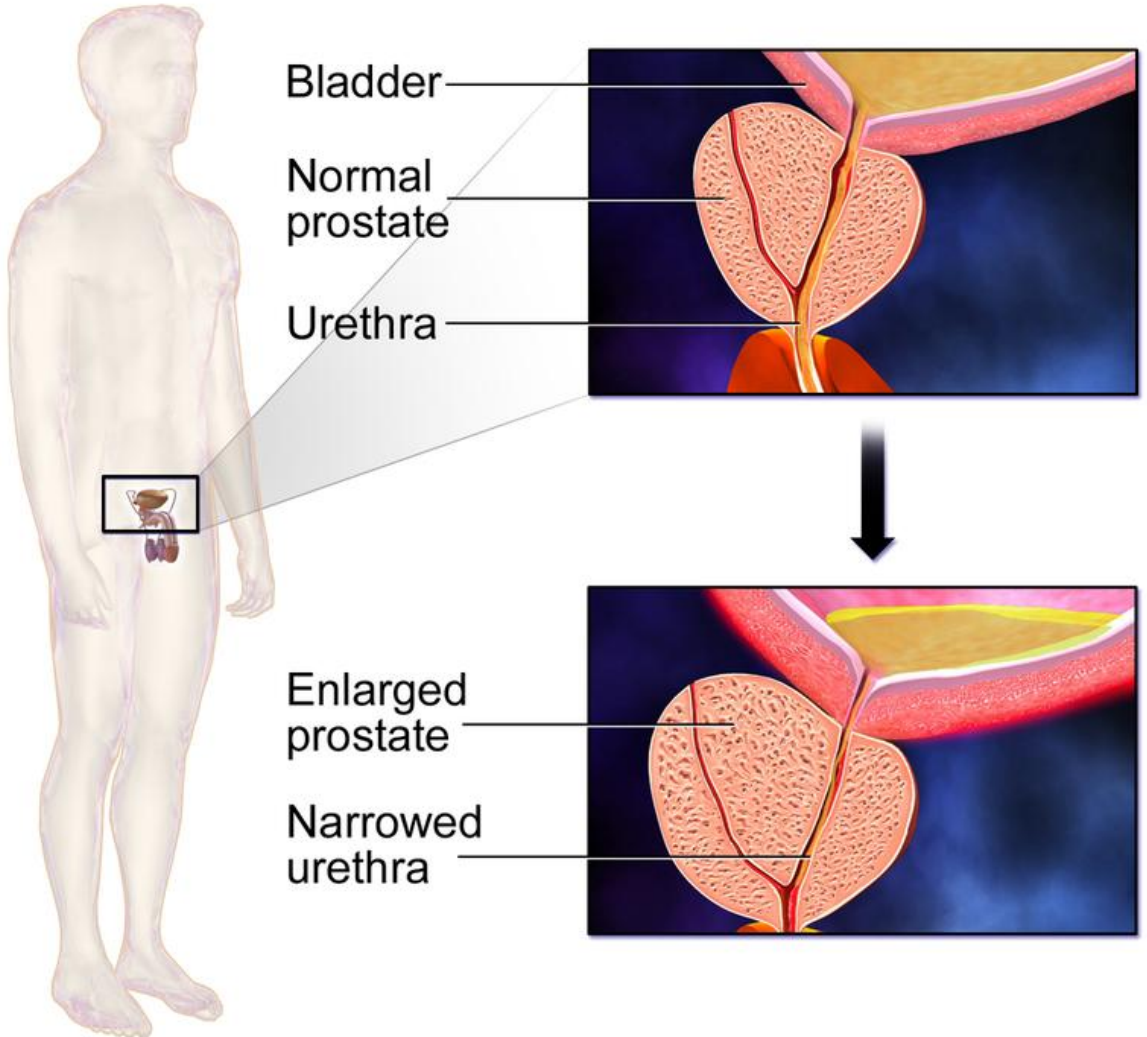
https://www.procure.ca/en/prostate-cancer/your-prostate/

Epidemiology of BPH

BPH is one of the most common diseases in aging males.



Presentation of Obstructive LUTS / BPH



Benign Prostatic Hyperplasia (BPH)

Consequences of delaying diagnosis

BPH significantly affects quality of life

- BPH is under-reported
  - fear of surgery
  - fear of cancer diagnosis
  - fear of sexual dysfunction

As the population of the world progressively ages, the burden of BPH (and prostate cancer) will inevitably rise.

BPH is Progressive

- BPH is a progressive condition
- Symptoms worsen with time
  - Risk of renal dysfunction if left untreated
  - Risk of Acute Urinary Retention (AUR)

Worsening Sx	Complications	Alarm symptoms
Bother	Acute Retention	Hematuria / UTI
Decrease QOL	Surgery	Bladder stones
		Renal failure

Evaluation of Lower Urinary Tract Symptoms

Mandatory Evaluation

- History
- Physical Exam with DRE
- Urinalysis

Recommended Tests

- Symptom Inventory
- PSA* (select pts)

Optional Tests

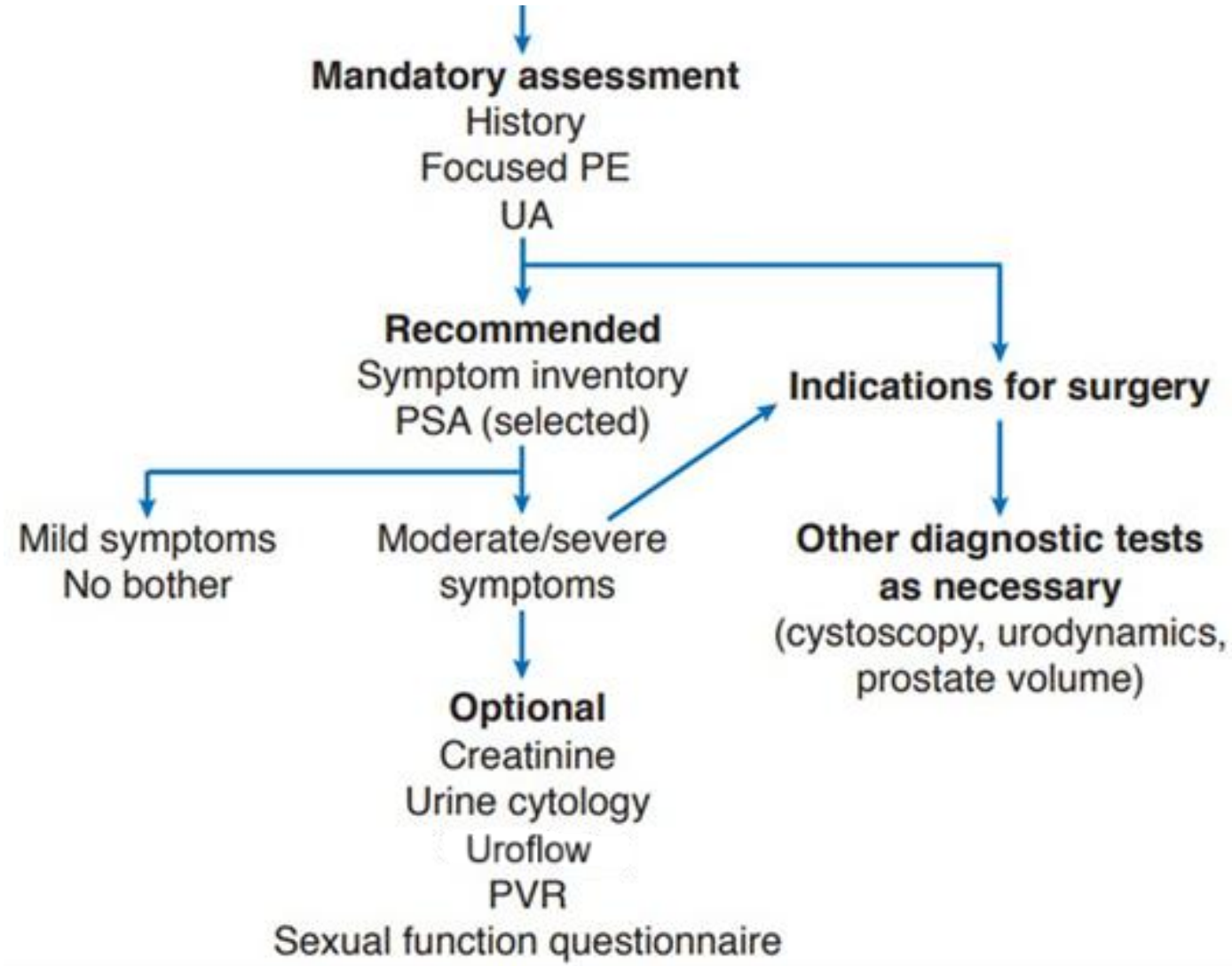
- Creatinine
- Uroflow/Urine cytology/Post Void Residual
- Sexual Health Questionnaire
- Voiding diary
- Obstructive sleep apnea screening
- Sexual function questionnaire

Not Recommended Routinely

- Cystoscopy
- Ultrasound
- Biopsy
- Urodynamics

Elterman D, Aubé-Peterkin M, Evans H, et al. UPDATE – Canadian Urological Association guideline: Male lower urinary tract symptoms/benign prostatic hyperplasia. Can Urol Assoc J 2022;16(8):245-5

Canadian Urological Association Guidelines



Elterman D, Aubé-Peterkin M, Evans H, et al. UPDATE – Canadian Urological Association guideline: Male lower urinary tract symptoms/benign prostatic hyperplasia. Can Urol Assoc J 2022;16(8):245-5

Key history questions

- Characterization of LUTS
  - FUND / WISE
  - Validated questionnaire is useful (IPSS)
- Pain?
- Hematuria?
- Incontinence?
- Nocturia?
- Previous urinary history? (UTIs, stones, instrumentation)
- Neurological ROS
- Medical History, Surgical History, Medication review
- Sexual history
- Fluid review
- Risk Factor Review
  - Family history
  - Smoking
  - Chemical exposures

LUTS: Warning Signs

- Hematuria
- Predominantly irritative symptoms
- Significant smoking history
- Prior surgery / radiation / trauma
- Other neurological symptoms Snoring
- Acute onset…

Need investigation for cause other than BPH

Differential diagnosis of LUTS

Obstruction vs polyuria

Too much fluid intake?

- Coffee / soda / alcohol / fluid management

Too much urine production?

- Diabetes insipidus or poorly controlled Diabetes mellitus
- Diuretics
- Pedal edema mobilization (CHF)
- Obstructive Sleep Apnea (OSA)

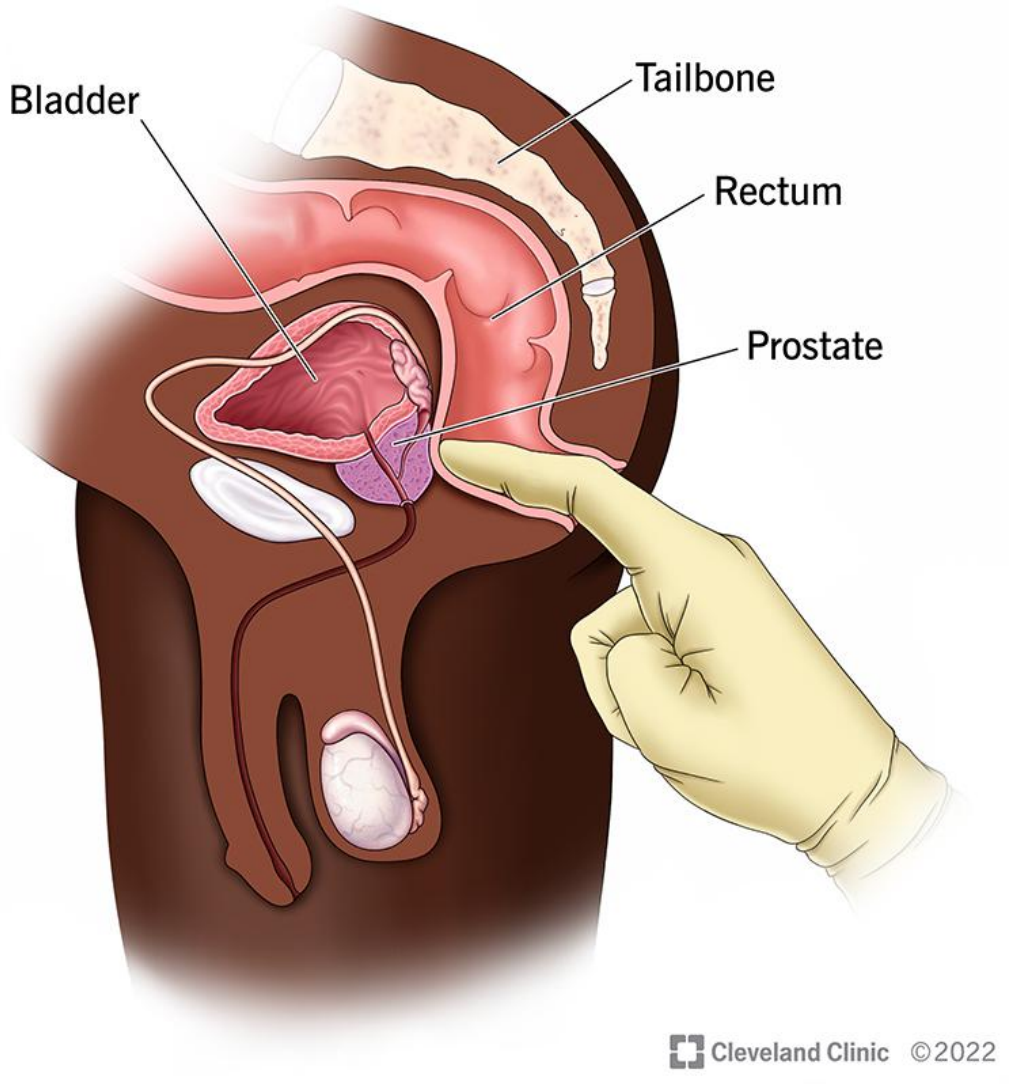
LUTS and Sleep Apnea

- Obstructive Sleep Apnea (OSA)
  - Increased Airway Resistance
  - Hypoxia
  - Pulmonary Vasoconstriction
  - Increased Right Atrial Pressure
  - Increased Atrial Natriuretic Peptide
  - Na and H2O excretion
  - **Nocturnal Polyuria**

Evaluation of LUTS

Physical Exam:

- Abdominal/Flank Exam
- Genital Exam
- Rectal Exam



Abnormal Digital Rectal Exam

Differential Diagnosis can include:

- BPH nodule
- Prostatic calculi
- Prostate cancer
- Ejaculatory duct abnormalities
- Seminal vesical abnormalities
- Granulomatous prostatitis (ie: tuberculosis)
- Rectal wall tumor, polyp, phlebolith

Size of gland does not necessarily correlate with degree of symptoms.

Evaluation of LUTS

Urinalysis

Dipstick should be confirmed with microscopy.

Causes of false positive dip:

- Semen
- Alkaline urine with pH >9
- Contaminating oxidizing agents
- Myoglobinuria
- Menstruation

Causes of false negative dip:

- Vitamin C high dose
- pH <5.1
- Dipstick exposed to air prior to use

Evaluation of LUTS

- **Mandatory**
  - History
  - P/E
  - UA
- **Recommended**
  - Symptom Inventory
  - PSA*
- Optional
  - Creatinine
  - Uroflow / PVR
  - Urine Cytology
  - Sexual Health Questionnaire
- Not Recommended Routinely
  - Cystoscopy
  - Ultrasound
  - Biopsy
  - Urodynamics

Evaluation of LUTS

Recommended Evaluation: Symptom Inventory and PSA

1. Validated Lower Urinary Tract Symptom Questionnaire
    - International Prostate Symptom Score (IPSS)
        - Addresses Quality of Life

2. PSA (if knowledge of cancer would change your treatment)

IPSS

Assesses:

- Incomplete Emptying
- Frequency
- Intermittency
- Urgency
- Weak Stream
- Straining
- Nocturia
- *Bother*

International Prostate Symptom Score (I-PSS)							
In the past month:	**Not at All**	**Less than 1 in 5 times**	**Less than Half the Time**	**About Half the Time**	**More than Half the Time**	**Almost Always**	**Your Score**
1. Incomplete Emptying How often have you had the sensation of not emptying your bladder?	0	1	2	3	4	5	
2. **Frequency** How often have you had to urinate less than every two hours?	0	1	2	3	4	5	
3. Intermittency How often have you found you stopped and started again several times when you urinated?	0	1	2	3	4	5	
4. Urgency How often have you found it difficult to postpone urination?	0	1	2	3	4	5	
5. Weak Stream How often have you had a weak urinary stream?	0	1	2	3	4	5	
6. Straining How often have you had to strain to start urination?	0	1	2	3	4	5	
	None	**1 time**	**2 times**	**3 times**	**4 times**	**5 times**	
7. Nocturia How many times did you typically get up at night to urinate?	0	1	2	3	4	5	
Total I-PSS Score							
Score:	1-7 Mild		8-19 Moderate		20-35 Severe		
		The first seven questions of the I-PSS are from the American Urological Association (AUA) Symptom Index					
Quality of Life Due to Urinary Symptoms							
	Delighted	**Pleased**	**Mostly Satisfied**	**Mixed**	**Mostly Dissatisfied**	**Unhappy**	**Terrible**
If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?	**0**	**1**	**2**	**3**	**4**	**5**	**6**

IPSS – Quality of Life Domain

	Delighted	Pleased	Mostly satisfied	Mixed – about equally dissatisfied and satisfied	Mostly dissatisfied	Unhappy	Terrible
Quality of life due to urinary symptoms If you were to spend the rest of your life with your urinary condition the way it is now, how would you feel about that?	0	1	2	3	4	5	6

Prostate Specific Antigen (PSA)

What is PSA?

- Made by both healthy and cancerous prostate cells
- Often elevated in presence of prostate cancer

A PSA test should be offered to patients who

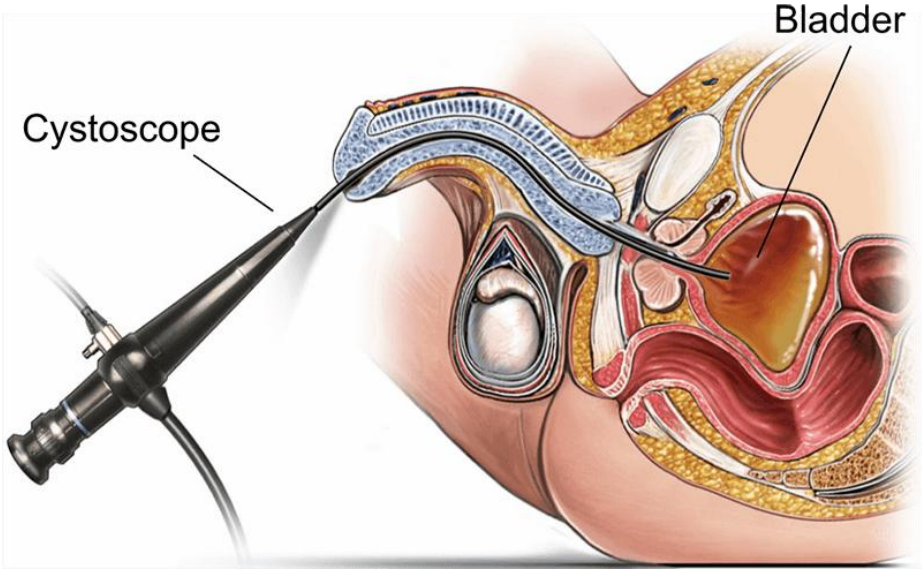
a) have at least a 10-year life expectancy, and

b) for whom knowledge of the presence of prostate cancer would change management, or

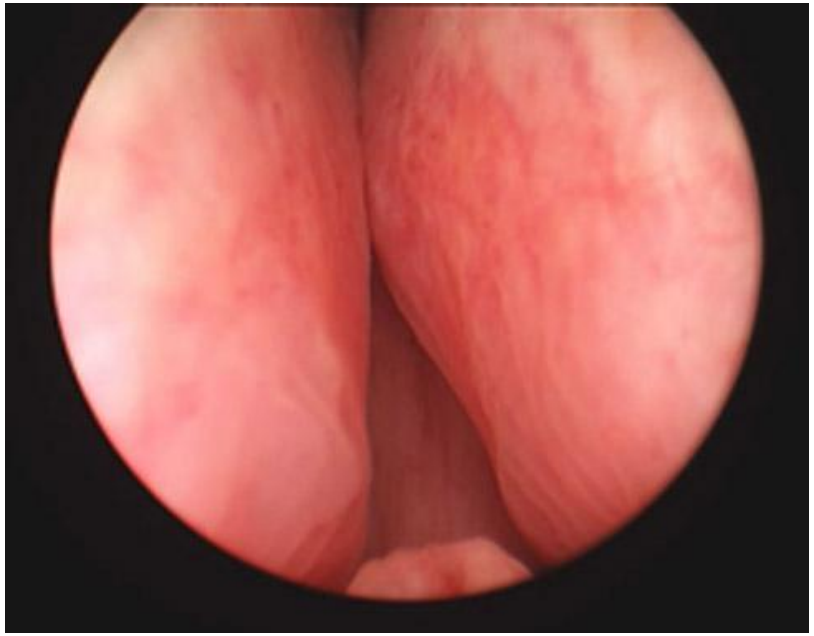
c) if PSA measurement would change the management of their voiding symptoms

Cystoscopy

- Flexible cystoscope
  - Used under local anaesthesia
- Helps determine size of prostate, location of obstruction, surgical planning.
- Cystoscopy is DIAGNOSTIC and not THERAPEUTIC in most cases.



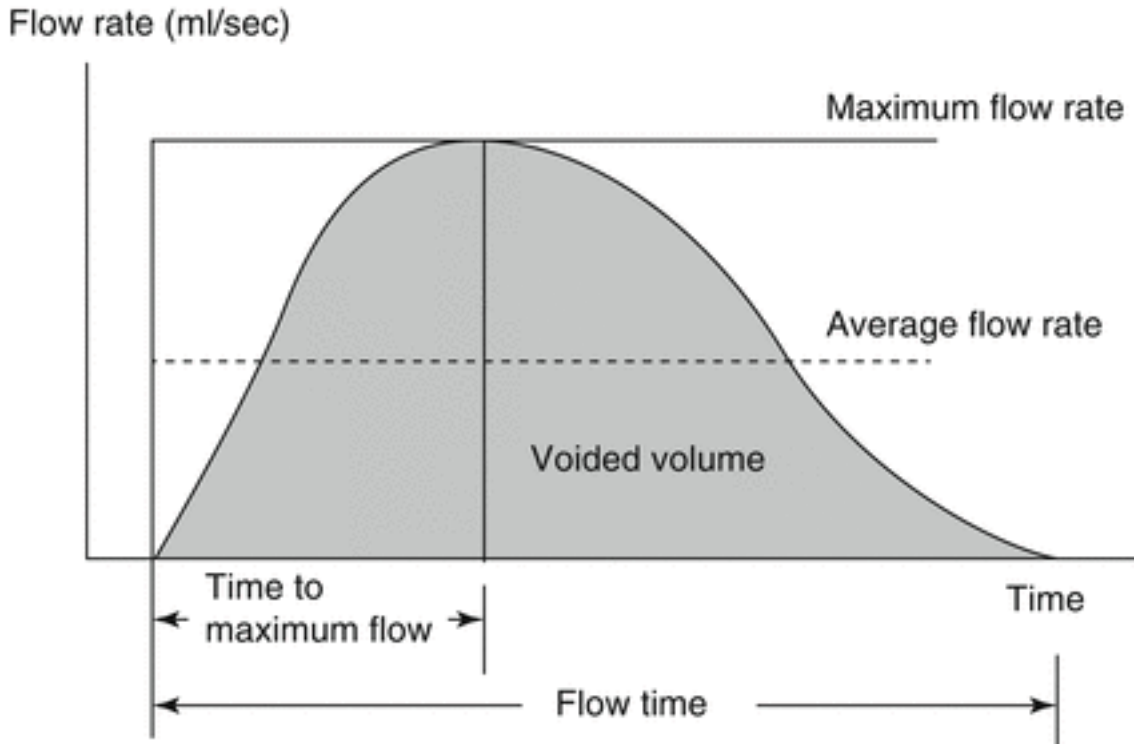
https://www.healthdirect.gov.au/surgery/flexible-cystoscopy-male



https://www.endeurology.com.au/urological-conditions/prostate-enlargement-bph/

Urodynamics (Pressure-Flow Studies)

- Measurement of bladder pressure and urine flow
- Catheter inserted and bladder artificially filled
- Flow and pressure measured while urinating
- High pressure with low flow suggests obstruction

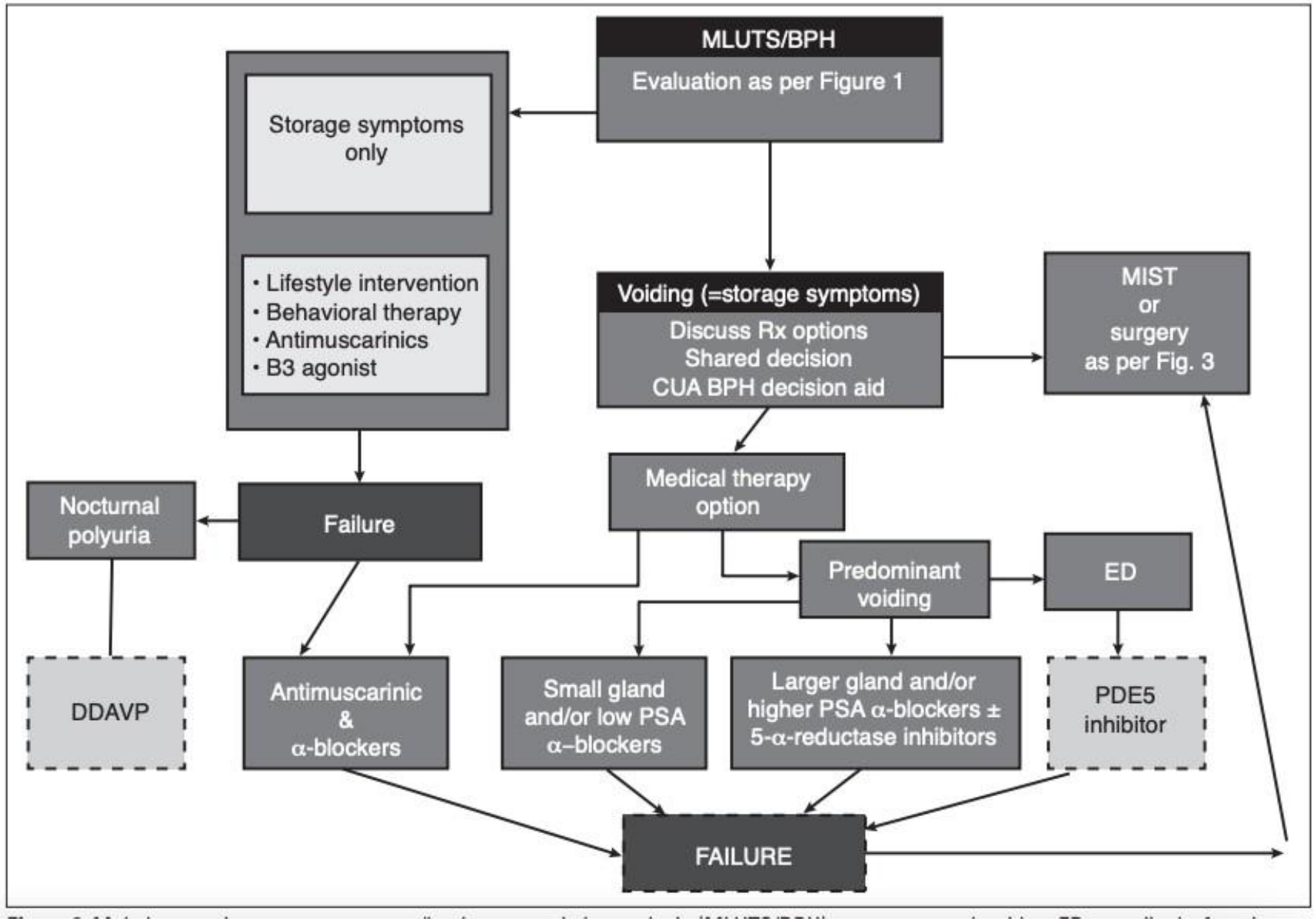


https://abdominalkey.com/noninvasive-urodynamics/

Urodynamic studies are considered when symptom complex is unclear.

BPH Treatment – Therapeutic Cascade

- Lifestyle measures: fluid restriction, exercise, improved nutrition
- Alpha adrenergic antagonists
- 5 alpha reductase inhibitors (5-ARi)
- Combination medical therapy
- PDE5-inhibitors
- Minimally invasive surgical techniques: TURP, laser (transurethral surgery)
- Surgery: open simple prostatectomy



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Lifestyle Modifications

- Exercise
- Improved nutrition
- Fluid management
- Decrease caffeine and alcohol
- Timing of diuretic administration
- Avoid decongestants
- Treat sleep apnea

LUTS and Exercise

- There is an inverse relationship between bother from LUTS and physical exercise. (Gann PH et al. *Prostate* 1995;26:40–49)
- Even low / moderate impact activity (walking) for 3 hours more per week associated with a 10% reduction in LUTS bother score. (Dal Masso et al. *International Journal of Cancer* 2006;118:2632–35)
- Time spent sedentary is directly proportional to bother from LUTS despite level of activity. (Platz EA et al. *Archives of Internal Medicine* 1998;158:2349–56)

Prescription Therapy

- Alpha Blockers
- 5-Alpha Reductase Inhibitors
- PDE-5 inhibitors
- Combination Therapy

Alpha Blockers

Specifically relaxes the smooth muscle of the prostate and bladder neck

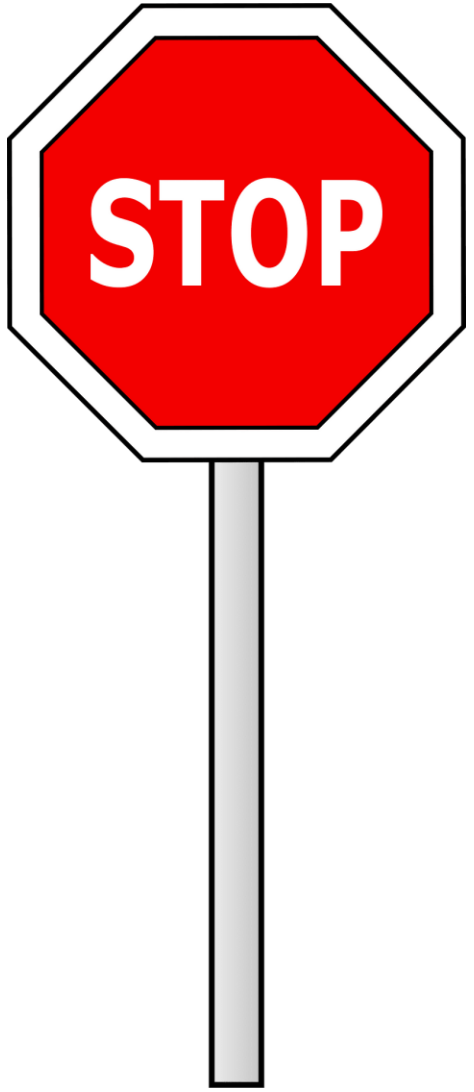
- Does not interfere with bladder contractility
- Does not affect PSA

Common Side Effects

1. Retrograde ejaculation
2. Dizziness
3. Asthenia (weakness)
4. Orthostatic hypotension
5. Flu-like syndrome

Alpha Blockers and Cataract Surgery

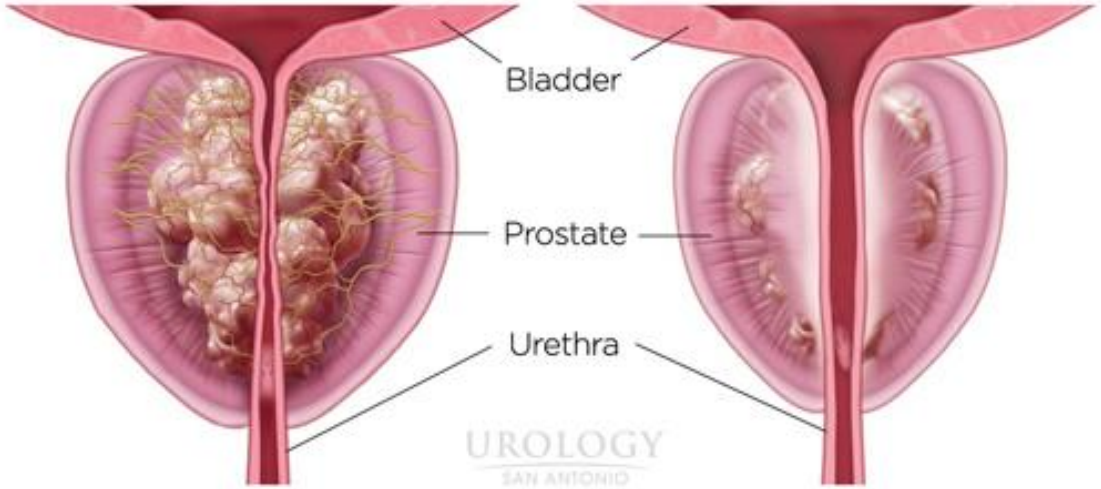
- Alpha blockers can pose risk of intraoperative floppy iris syndrome during cataract surgery
  - Even once medication discontinued
    - No established benefit to stopping prior to surgery
  - Tamsulosin may have the highest risk, but there is risk with all



- Advise patients on alpha blockers to discuss this with their ophthalmologist prior to cataract surgery
- Treat vision problems / cataracts prior to initiation of alpha-blocker

5-alpha Reductase Inhibitors

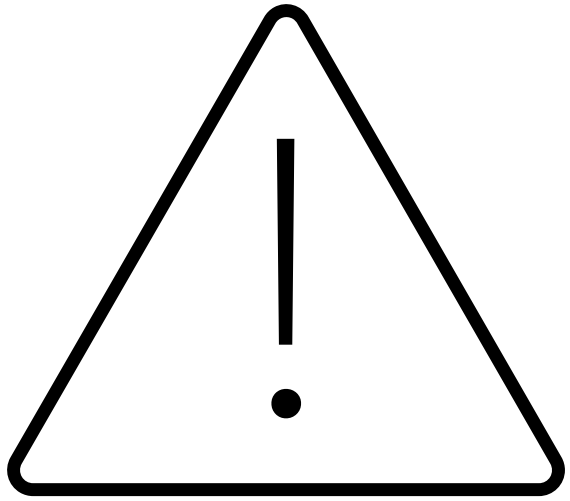
- Regulate androgen available to prostate by blocking conversion of testosterone to dihydrotestosterone (DHT)
- Slow the rate of prostate enlargement, or decrease prostate size
- Reduce prostate volume and relives “static” compression by BPH
- Reduce PSA by ~50%
- Takes 3-6 months to exert clinical effect



5-alpha Reductase Inhibitors

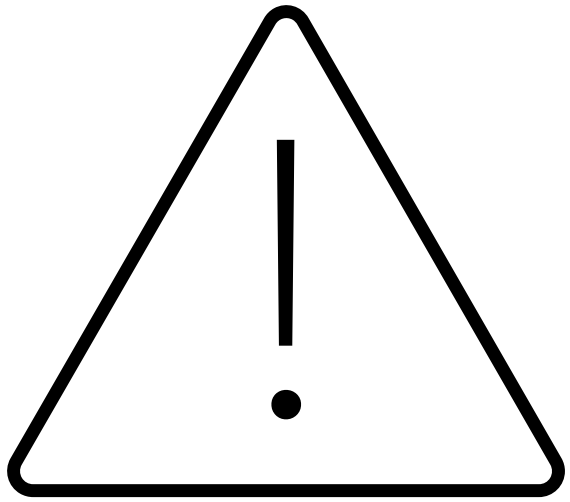
Common Side Effects

1. Erectile Dysfunction – 10%
2. Decreased Libido – 8%
3. Ejaculatory Dysfunction – 5%
4. Gynecomastia – 1%
5. Breast Tenderness – 1%



5-alpha Reductase Inhibitors and PSA

- 5ARi tend to reduce PSA by half at 6 months.
- PSA will drop in both benign and malignant conditions.
- If PSA continues to rise while on 5ARi, malignancy must be considered.



Clinical Practice Pearls

- Combination therapy (alpha blocker with 5ARi) may be utilized and is typically best in people with:
  - Prostate Volume >30-40cc
  - Moderate or severe bother

- Bother is a good guide for whether 5ARi monotherapy or combination therapy should be used

- Alpha-blocker withdrawal can be considered at 6–9 months: those with severe symptoms may warrant longer-term combination therapy

PDE5 Inhibitor Use

Tadaladfil 5mg daily:

- Improves LUTS
- Exact mechanism unknown
- Helps concurrent erectile dysfunction
- May potentiate hypotension in those taking concurrent alpha-blockers

PDE5 Inhibitors and LUTS

- LUTS severity correlates to erectile dysfunction (ED) severity
- PDE5i when used for ED
  - Patients reported improvement in LUTS
  - Mechanism is unclear: Relaxation of prostatic smooth muscle?
- Recent studies of PDE5i for LUTS show improvement in symptoms of same magnitude as alpha-blockers!
  - QOL
  - Flow rate

Surgical Therapy

Indications for Surgery

- Bothersome symptoms despite maximal medical treatment
- Inability to tolerate medical therapy
- BPH-related complications
    - Urinary retention (inability to void)
    - Bladder calculi
    - Recurrent UTI
    - Recurrent hematuria from the prostate
    - Upper tract dysfunction (hydronephrosis, renal dysfunction)

Surgical approach will depend on:

- Patient’s prostate size
- Surgeon’s judgment
- Patient’s co-morbidities

Surgical Therapy

"Minimally invasive therapies"

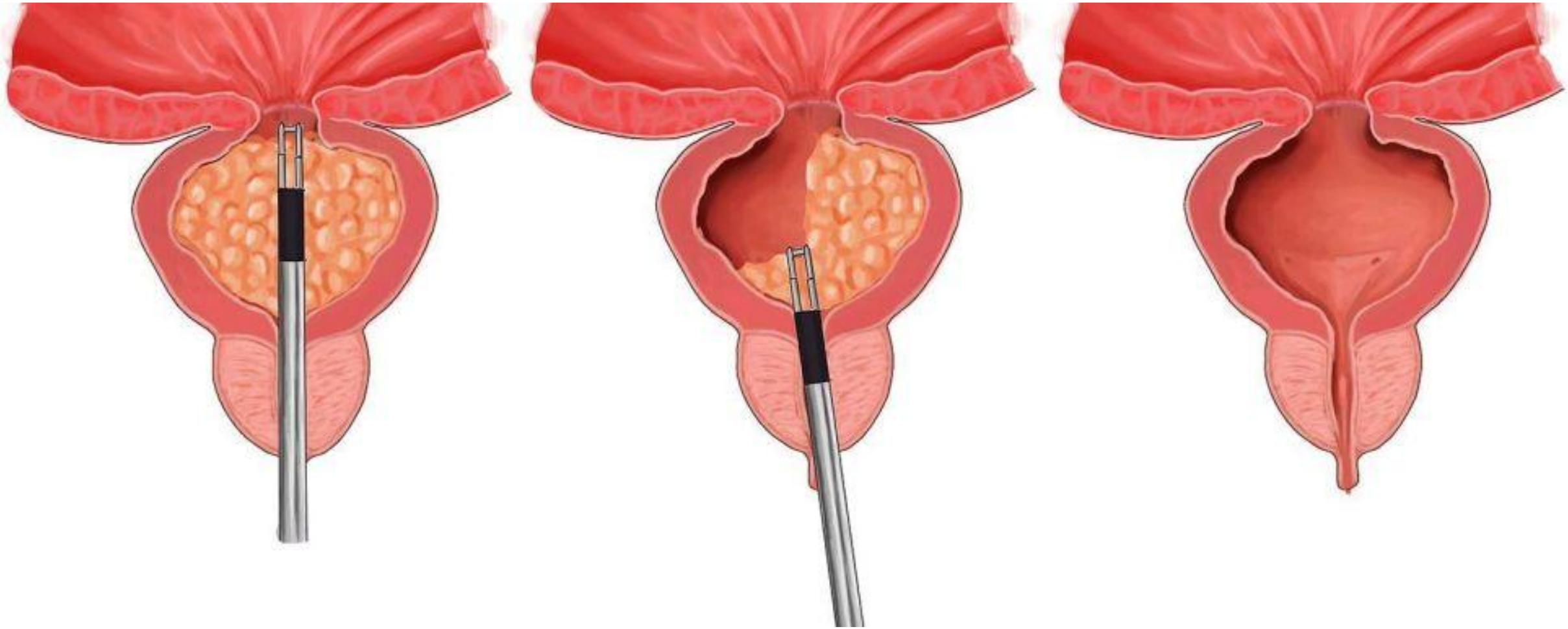
- Injections – ie: Botox, alcohol
- Prostatic stents
- Microwave heat treatment
- High Intensity Frequency Ultrasound (HIFU)
- Needle ablation / radio-wave treatment

Transurethral resection of the prostate (TURP)

Laser prostatectomy

Open surgery

Transurethral Resection of the Prostate (TURP)



https://www.urology.com.my/turp-for-bph/

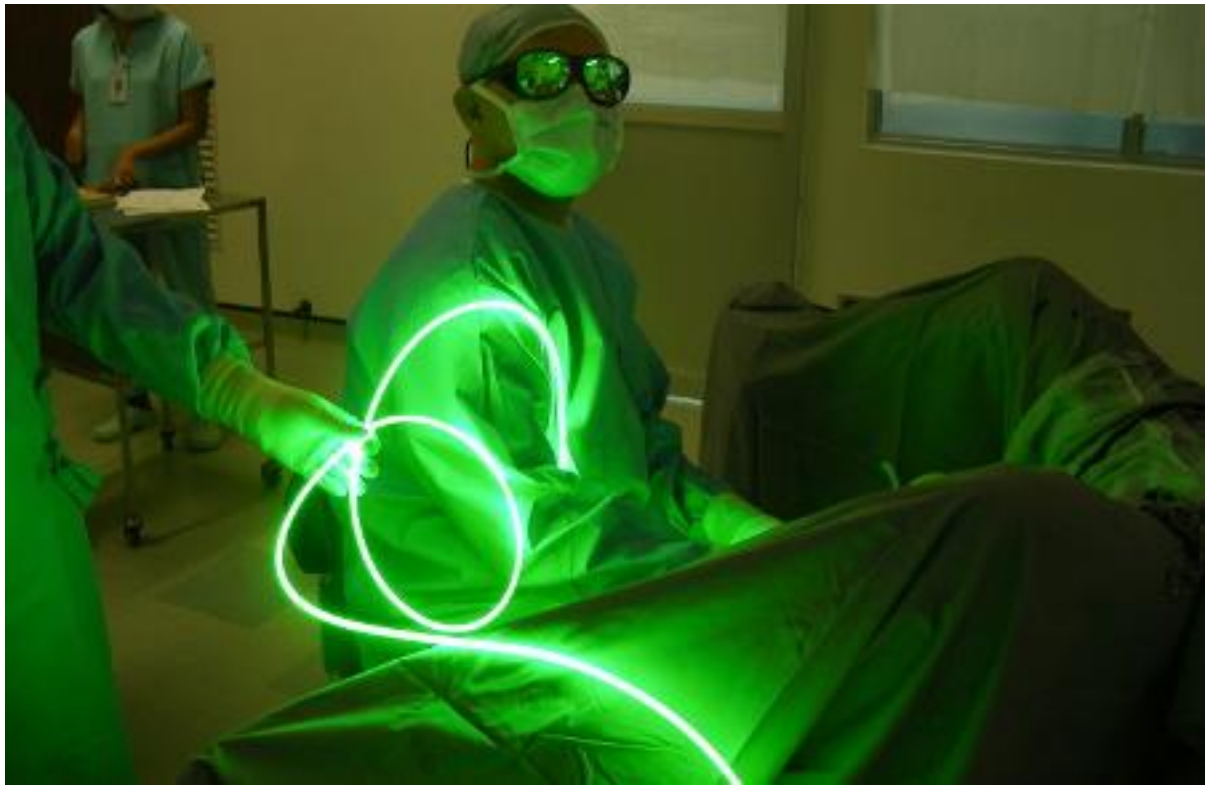
Potential TURP Complications

- Retrograde ejaculation (very common > 90%)
- Urinary incontinence (1-2%)
- Erectile dysfunction (rare)
- Bladder neck contracture/urethral stricture (1-10%)
- Bleeding (~5% need a transfusion)

Alternatives to TURP

- Transurethral vaporization with PlasmaButton
- GreenLight™ Photoselective Vaporization of the prostate (PVP)
- Holmium Laser Ablation of Prostate (HoLAP)
- Holmium Laser Enucleation of Prostate (HoLEP)
- Transurethral incision of the prostate
- Prostatic urethral lift
- Water vapor thermal therapy

GreenLight Laser Vaporization of the Prostate



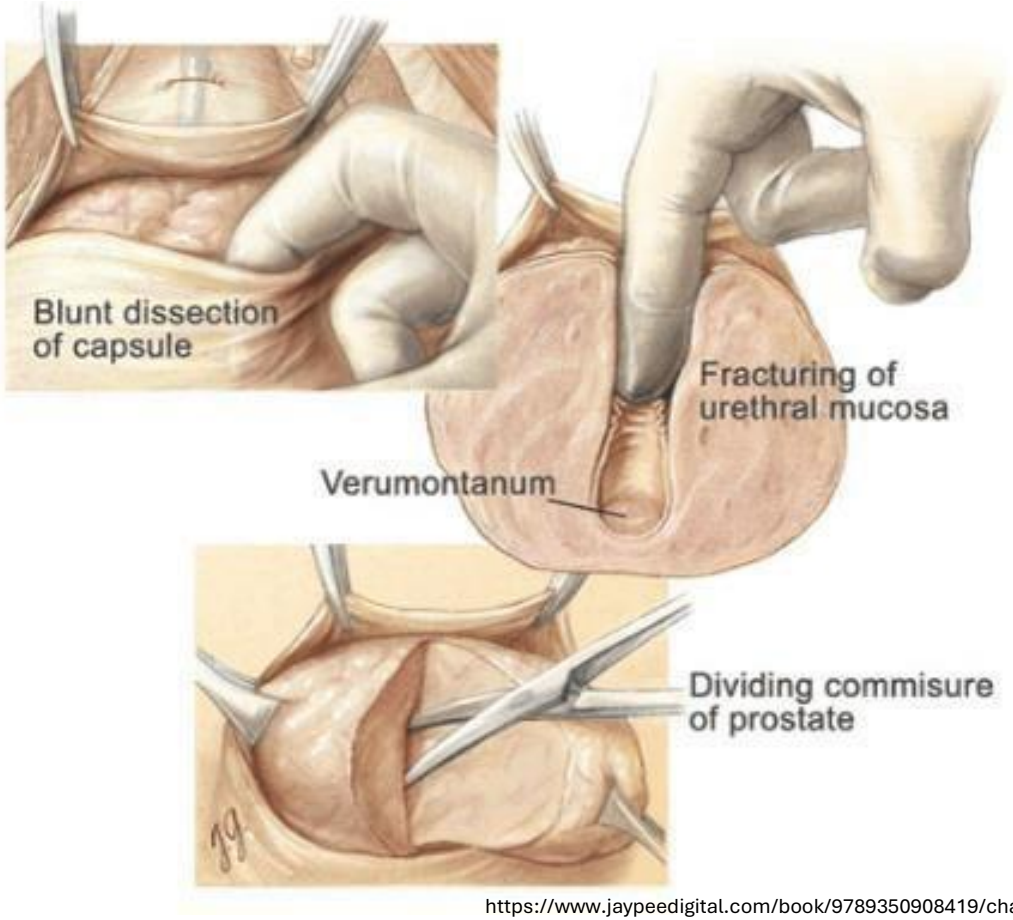
https://ccmurology.com/surgery/greenlight-laser-turp/

https://gmurology.com.au/other-urological-procedures/greenlight-laser-vaporisation-of-prostate-pvp/

Open Simple Prostatectomy

- Indications:
  - Gland Size > 80cc
  - Urethral Stricture
  - Hip contractures
  - Need for concomitant bladder surgery (diverticulum, big stones)

- *This is not a Radical Prostatectomy, that is for cancer surgery.*



https://www.jaypeedigital.com/book/9789350908419/chapter/ch7

When to consider a urology referral?

- Failure of medical therapy
- Urinary tract infections
- Hematuria, retention, renal compromise
- Concerns re: elevated PSA, abnormal DRE
- Any consecutive rise in PSA while on 5ARi

Take Home Messages

- Alpha-blockers are faster and provide earlier symptom relief than 5-ARIs
- All Alpha-blockers have same efficacy but different side effect profiles
- Combo Alpha-blocker and 5ARi therapy works the best for larger prostates
- PDE5i may be useful with concomitant ED
- Referral to a urologist is indicated if:
  - Failure of medical therapy
  - Rising PSA on 5ARi

Take Home Messages

- Not all LUTS are BPH
- Think anatomically to investigate symptoms
- Lifestyle modifications are first line
- Medical therapy (alpha blockers, 5ARI) for BPH works

Drug Class	Presumed Mechanism	Therapeutic Effect	Common Adverse Effects
Alpha Blockers	Relax smooth muscle in bladder neck and prostate	Improve urinary symptoms and flow	Ejaculatory dysfunction, dizziness
5-Alpha Reductase Inhibitors (5-ARI)	Decrease prostate size by inhibiting conversion of testosterone to DHT	Improve symptoms and flow over time	Sexual dysfunction (libido, erectile, ejaculatory)
Anticholinergics	Relax detrusor muscle of bladder	Reduce irritative urinary symptoms (e.g., urgency, frequency)	Dry mouth, constipation, blurred vision
PDE-5 Inhibitors	Relax smooth muscle via nitric oxide pathway	Improve symptoms and flow; also benefit erectile function	Headache, flushing, hypotension