New Horizons in Geriatric Urology

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Geriatric Urology

Urology is one of the surgical specialties that has been most affected by the growing demographic of older adults. Urological problems are common in elderly people, and care of patients aged 65 and older represents a large proportion of many urologists' practices. However, this has also presented unique challenges to the development of the field of geriatric urology as an identified subspecialty.[1] It has been proposed that urology holds a unique position in the provision of geriatric care because urologists manage personal, often very private, aspects of the elderly adult's physical and emotional well-being, such as control of urination.[2]

The geriatric patient is characterized by his age, multimorbidity, and multimedication. This results in a particular vulnerability, which requires geriatric methods, to comply with the requirements of the geriatric patient, with his functional deficits, abilities, capabilities, and skills. Basic assessments analyze typical problem areas of geriatric patients, such as mobility, autonomy, urinary incontinence, activities of daily life, cognition, and others.[3] Relevant and common issues in geriatric urology are functional disorders of the lower urinary tract, infectiology, hematuria, and benign prostate hyperplasia.[4] Indications for urologic referral are depicted in Box 1.

Major Geriatric Urological Diseases

Major geriatric urological diseases include urinary incontinence, urological cancer, bladder outlet obstruction such as benign prostatic hyperplasia, sexual dysfunction, and urinary tract infection. In addition to major diseases, other specific diseases or abnormal status are perioperative delirium, fluid and acid-base imbalance, polypharmacy, and postoperative pain. Besides urological and other specific diseases, urinary catheter indwelling due to voiding dysfunction and urinary tract infection are special problems in nursing homes. These frail elderly patients represent some of the most complex individuals seen in urological practice and often require specialized care. [2]

Urinary Incontinence

The prevalence of urinary incontinence (UI) and overactive bladder rises with age, and elderly people are the fastest-growing segment of the population. Many elderly people assume UI is a normal part of the aging process.[5] UI may be defined as any involuntary or abnormal urine loss. UI is characterized by lower urinary tract symptoms (LUTS), which include both storage and voiding problems. UI can be further defined by the patient's presentations and symptoms. Urge urinary incontinence (UUI) is defined as involuntary urine leakage associated with urgency. Stress

Box 1: Indications for urologic referral

- Incontinence associated with relapse or recurrent symptomatic urinary tract infections
- Incontinence with new-onset neurologic symptoms, muscle weakness, or both
- Marked prostate enlargement
- Pelvic organ prolapsed past the introitus
- Pelvic pain associated with incontinence
- Persistent hematuria
- Persistent proteinuria
- Postvoid residual volume > 200 mL
- Previous pelvic surgery or radiation
- Uncertain diagnosis

Source: Khandelwal C, Kistler C. Diagnosis of urinary incontinence. *Am Fam Physician.* 2013;87(8):543-50.

Table 1: Classification, Causes, and Symptoms of Urinary Incontinence		
Type of Incontinence	**Common Causes**	**Common Symptoms**
Urge urinary incontinence (UUI)		
Idiopathic detrusor overactivity	Urinary tract infections	Urgency and frequency, day or night
Neurogenic detrusor overactivity	• Neurological disorders • Parkinson's disease • Alzheimer's disease • Cerebrovascular accidents (e.g., stroke) • Trauma • Medications	Urinary frequency, urgency and incontinence
Stress urinary incontinence (SUI)		
Stress incontinence (outlet incompetence)	• Pelvic surgery • Parity (childbirth) • Constipation	Small volumes of urine loss with coughing or sneezing
Mixed urinary incontinence (MUI)		
Mixed UUI and SUI	• Pelvic surgery • Parity (childbirth) • Constipation	Symptoms may include urge and stress features
Overflow incontinence (OFI)		
Overflow incontinence	• Benign prostatic hyperplasia (BPH) • Bladder outlet obstruction • Fecal impaction • Hypotonic/neurogenic bladder • Urethral stricture disease	Poor stream, incomplete emptying, and dribbling

Source: Demaagd GA, Davenport TC. Management of urinary incontinence. *P T.* 2012;37(6):345-361H.

urinary incontinence (SUI) is defined as involuntary urine leakage associated with specific activities (e.g., sneezing and coughing. Mixed urinary incontinence (MUI) includes features of both UUI and SUI (Table 1). The term overactive bladder (OAB) is often used to describe UI. OAB comprises a constellation of symptoms typically characterized by urgency, with or without UUI, accompanied by frequency and nocturia.[6]

Treatment is instituted according to the type of incontinence and includes behavioural training (prompted voiding, bladder training, pelvic muscle rehabilitation, pelvic floor exercises), transcutaneous electrical nerve stimulation, catheterization, use of absorbent pads or pharmacologic or surgical treatment.[7]

Use of Flavoxate in Managing Dysuria, Urgency, Frequency and Incontinence

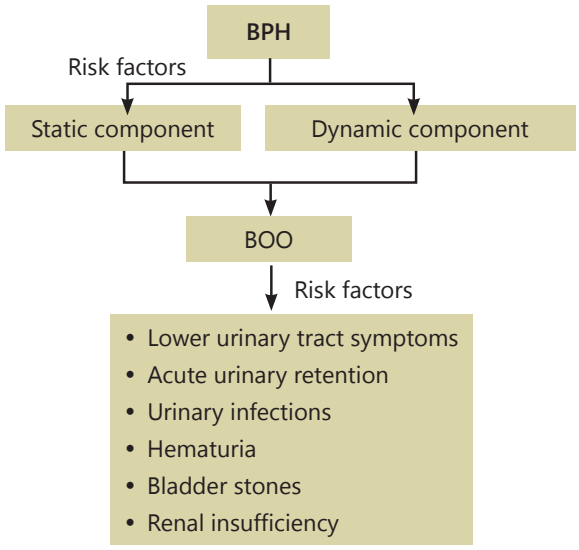
Among various pharmacological interventions for the treatment of OAB, flavoxate has been widely used and accepted among the urologists and the general physicians for decades globally.[7] Flavoxate is non anticholinergic in nature. Other drugs which are used for urinary incontinence eg Oxybutynin, Solifenacin tolterodine are anticholinergics and has side effects like dryness of mouth, tachycardia, urinary retention, constipation etc. Mirabegron is known to cause hypertension and hence should be used with extra caution in hypertension. Most of the elderly population may suffer from hypertension, CV disease, BPH etc. Hence anticholinergics and newly launched drug mirabegron may have to be used with caution.

Main action of flavoxate is effect on smooth muscles by modest Ca^{2+} antagonistic activity with local anaesthetic properties. Clinical effects in patients with detrusor overactivity with frequency, urgency and incontinence has been studied, have shown fewer and milder side effects with other drugs with anticholinergic properties.[8]

Benign Prostatic Hyperplasia

Benign prostatic hyperplasia (BPH) is a histological diagnosis associated with unregulated proliferation of connective

Figure 1: Natural history of BPH and BOO throughout the different stages of clinical progression



Abbreviations: BPH-Benign prostatic hyperplasia; BOO-Bladder outlet obstruction

Source: Patel ND, Parsons JK. Epidemiology and etiology of benign prostatic hyperplasia and bladder outlet obstruction. *Indian J Urol*. 2014;30(2):170-6.

tissue, smooth muscle and glandular epithelium. BPH may cause physical compression of the urethra and result in anatomic bladder outlet obstruction (BOO) through two distinct mechanisms: First, an increase in prostate volume, termed the static component; second, an increase in stromal smooth muscle tone, termed the dynamic component. BOO, in turn, may present clinically as lower urinary tract symptoms (LUTS), urinary tract infections, acute urinary retention (AUR), renal failure hematuria, and bladder calculi (Figure 1). BPH and BOO have a significant impact on the health of older men. Although age and genetics play important roles in the etiology of BPH and BOO, recent data have revealed novel, modifiable risk factors that present new opportunities for treatment and prevention (Table 2). These risk factors appear to potentially influence the natural history of BPH and BOO throughout the different stages of clinical progression.[9]

Management of BPH: Focus on Tamsulosin

Besides watchful waiting and surgery, current medical therapies to treat LUTS/BPH include α1-adrenergic receptor antagonists (tamsulosin), 5α-reductase inhibitors, and phytotherapy. α1-Adrenergic receptor antagonists are the main treatment for patients with BPH presenting with LUTS and are used by 80% of physicians as the first agent to treat this common condition in the aging male. Use of α-blockers in BPH is based on research showing that prostate smooth muscle mediates BOO via the α-adrenergic receptor-mediated mechanism. α-Blockers relax prostatic smooth muscle, thereby improving BPH-related symptoms. Three subtypes of α receptors exist: α1A, α1B, and α1D. α1A composes 70% of the human prostatic receptors, but this percentage may actually increase to 80% in patients with BPH.[10]

Tamsulosin has demonstrated its efficacy in the treatment of BPH. It has a 20- to 38-fold greater affinity for α1A-adrenergic receptors than for α1B receptors. This α1A subtype adrenergic receptor selectivity is considered to be responsible for tamsulosin's low cardiovascular side effects and lack of interaction with antihypertensives. A 4-year extension, multicenter, open-label, phase IIIB clinical study evaluated long-term efficacy, safety, and tolerability of tamsulosin for up to 6 years. The study found a consistent statistically significant improvement in American Urological Association symptom scores over 6 years, and most patients showed improvement during the first year that was sustained over 6 years.[10]

Combination Therapy in BPH: Tamsulosin and Dutasteride

The combination of dutasteride and tamsulosin is indicated for BPH in men with an enlarged prostate. Dutasteride is the only dual inhibitor of 5α-reductase approved for use in the treatment of men with symptomatic BPH/BPE. Long-term data from the multicenter CombAT study showed that combination therapy with dutasteride and tamsulosin results in significantly greater decreases in International Prostate Symptom Score and significant increases in peak urinary

Table 2: Risk factors for benign prostrate hyperplasia and lower urinary tract symptoms

Non-modifiable	Modifiable
• Age • Genetics • Geography	• Hormones • Testosterone • Dihydrotestosterone • Estrogen • Metabolic syndrome • Obesity • Diabetes • Diet • Physical activity • Inflammation

Abbreviations: LUTS-Lower urinary tract symptoms; BPH-Benign prostatic hyperplasia; DHT-Dihydrotestosterone

Source: Patel ND, Parsons JK. Epidemiology and etiology of benign prostatic hyperplasia and bladder outlet obstruction. *Indian J Urol*. 2014;30(2):170-6.

Table 3: CombAT 4-year secondary endpoints – clinical progression			
	Combination (n = 1610)	Dutasteride (n = 1623)	Tamsulosin (n = 1611)
At year 4	%	%	%
Clinical progression	12.6%	17.8%*	21.5%*
Risk reduction versus combination (95% CI)		31.2% (17.7%–42.5%)	44.1% (33.6%–53.0%)
IPSS increase ≥ 4 points	8.6%	13.1%*	14.2%*
AUR	1.6%	2.3%	5.1%
Incontinence	3.0%	3.7%	4.0%
UTI	0.2%	0.3%	0.3%
Renal insufficiency	<0.1%	0.1%	0.4%

Abbreviations: AUR, acute urinary retention; BPH, benign prostatic hyperplasia; IPSS, International Prostate Symptom Score; ITT, intention-to-treat; UTI, urinary tract infection.

Source: Roehrborn CG, Siami P, Barkin J, Damião R, Major-Walker K, Nandy I, Morrill BB, Gagnier RP, Montorsi F, CombAT Study Group. The effects of combination therapy with dutasteride and tamsulosin on clinical outcomes in men with symptomatic benign prostatic hyperplasia: 4-year results from the CombAT study. ***Eur Urol.*** **2010; 57(1):123-31.**

flow rates versus monotherapy with either dutasteride or tamsulosin. Additionally, a significantly greater reduction in total prostate and transition zone volume was achieved in the combination group as compared to monotherapy with tamsulosin (Table 3).[11,12]

Urinary Tract Infections in the Geriatric Patients

Urinary tract infections (UTI) are the second most common infection in geriatric population. Factors facilitating the development of UTI include pelvic prolapse, cystocele, rectocele, bladder diverticulum, urinary reflux, incontinence, lack of perineal hygiene, vaginal atrophy, estrogen deficiency in women and prostate diseases in men. Mental status changes, immunosuppression, diabetes, neurological diseases, invasive procedures, strictures and anatomical changes are among the main risk factors in the elderly. It has the potential for serious complications and mortality; therefore, elderly patients with urinary tract infection should receive immediate empirical treatment based on anamnesis, clinical evaluation and urinalysis and should be re-examined using results from cultures and antibiograms upon follow-up.[13] The suggested approach for the evaluation of UTI in elderly is depicted in Table 4.[14]

Role of Nitrofurantoin in UTI

Nitrofurantoin is an antibiotic medication that is used for the treatment of uncomplicated lower urinary tract infection. It is effective against most gram-positive and gram-negative organisms including *Escherichia coli*, Enterococci, Klebsiella, *Staphylococcus saprophyticus*, and Enterobacter. It's spectrum of susceptibility also includes Shigella, Salmonella, Citrobacter, Neisseria, Bacteroides, group B streptococcus, *Staphylococcus aureus*, and *Staphylococcus epidermidis*.[15] Nitrofurantoin is often underutilized in older adults because of its contraindication in patients with renal insufficiency. However, evidence suggests that nitrofurantoin is an effective agent for the treatment of UTI in older adults with a creatinine clearance greater than 40 mL/min. Nitrofurantoin also has lower rates of overall resistance compared to trimethoprim/sulfamethoxazole and fluoroquinolones, making it an effective empiric antibiotic choice for many older adults.[16] Modified release nitrofurantoin should be used instead of conventional nitrofurantoin formulations, as it reduces the dosing frequency and improves GI Tolerability (gastrointestinal).

Urological Cancer

Age is now widely accepted as the greatest single risk factor for developing cancer, and cancer is considered primarily as a disease of the elderly. The geriatric population presents a unique set of challenges in urologic oncology. The early detection of urological cancers is pivotal for successful patient treatment and management. Management of elderly urologic oncology patients differs from that of younger patients, as life expectancy is more influential in determining whether a given treatment is life-lengthening and whether treatment risks and potential complications are acceptable. The development of frailty measures and biomarkers to estimate surgical risk shows promise, with several assessment tools predictive of surgical complications. Intriguingly, decreased dependence on chronologic age is important when assessing surgical fitness, as age cutoffs prevent appropriate treatment of many elderly patients

Table 4: The suggested approach for the evaluation of UTI in elderly	
Condition	**Definition**
UTI	Presence of microbial pathogens within the urinary tract
Asymptomatic bacteriuria	Bacteria or yeast isolated in appropriate quantitative counts from a urine culture without accompanying signs or symptoms attributable to the genitourinary tract In women patients: 2 consecutive clean-catch midstream urine samples growing at least 10^5 colony-forming units/mL with no more than 2 species of microorganisms and no indwelling urinary catheter within 7 days of first urine culture
Symptomatic UTI (without indwelling urinary catheter)	Can include cystitis, pyelonephritis, urosepsis, septic shock, or all combined Defined by at least 2 of following criteria: fever (>38°C) in a patient who is aged 65 years or older; frequency or urgency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness (not explained by other diagnoses); positive urine culture of at least 10^5 colony-forming units/mL with no more than 2 species of microorganisms; and pyuria (≥10 white blood cells/mm^3 of unspun urine)
Uncomplicated UTI	Symptomatic UTI in a normal genitourinary tract with no prior instrumentation
Complicated UTI	Symptomatic UTI in patients with either functional or structural abnormality, a history of urinary instrumentation or systemic diseases such as renal insufficiency, transplantation, diabetes, or immunodeficiency
Recurrent UTI	Two or more symptomatic UTIs within 6 months or 3 or more infections within 1 year
Urosepsis	Sepsis caused by UTI
Abbreviations: UTI, urinary tract infection	
Source: Mody L, Juthani-Mehta M. Urinary tract infections in older women: a clinical review. *JAMA*. 2014;311(8):844-54.	

who would benefit from surgery. Within bladder, kidney and prostate cancers, continued refinement of surgical techniques offers a broader array of options for the geriatric patient. Lastly, it should be correct to value the physiologic capabilities of each organ system and all co-morbidities in the elderly, in order to face possible risks of treatment or improbable benefits.[17,18]

Conclusion

Geriatric patients constitute the great majority of patients seen in adult urologists' offices. Major geriatric urological diseases include urinary incontinence, urological cancer, bladder outlet obstruction such as benign prostatic hyperplasia, sexual dysfunction, and urinary tract infection. Development of treatment programs in elderly urologic patients require some cautions due to potential interference with poor renal function or crossover effects with central or peripheral nervous system.

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