Management del paziente affetto da iperplasia prostatica benigna

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PRINCIPLES OF FUNCTIONAL DIAGNOSTIC AND URODYNAMICS

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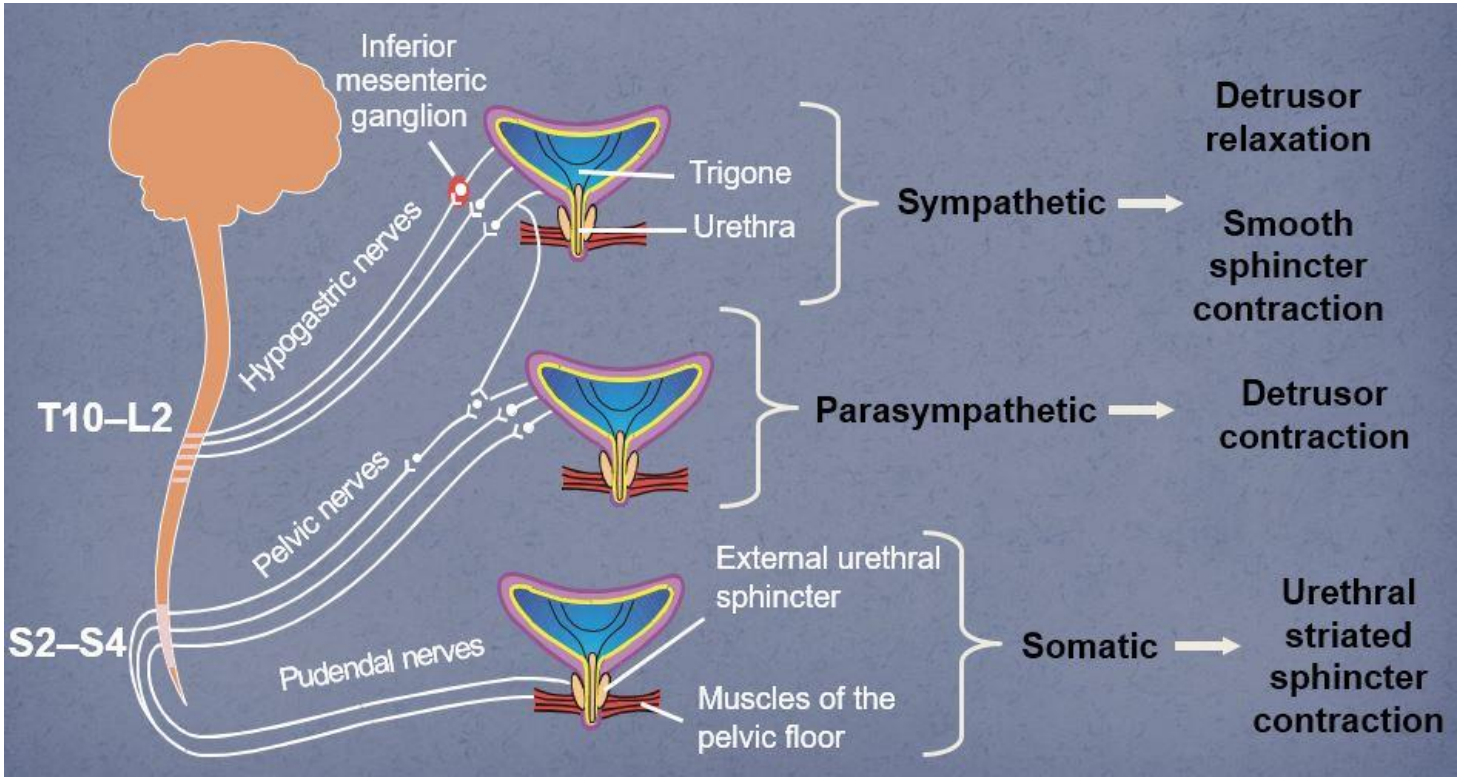
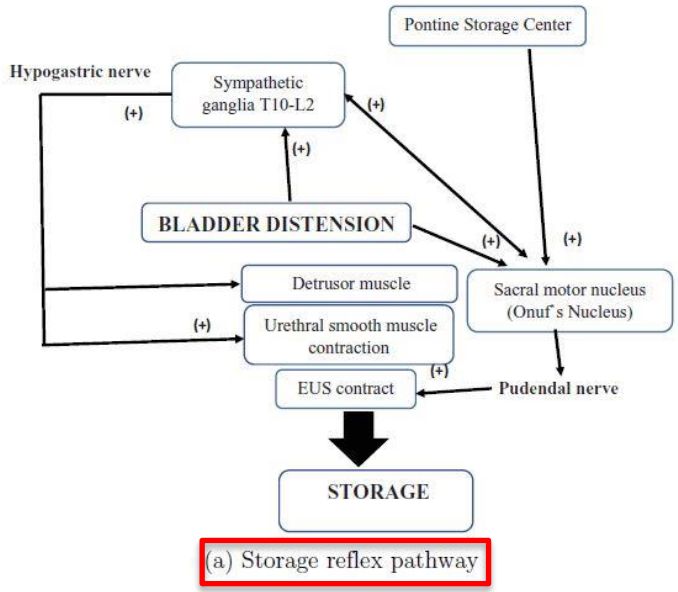
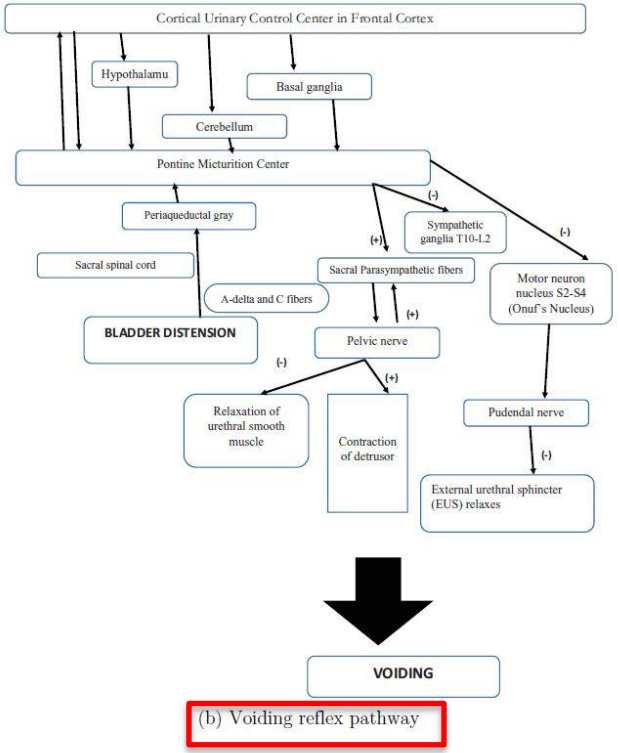
Bladder Neurophysiology



Abrams P, Wein AJ. The Overactive Bladder—A Widespread and Treatable Condition. Sweden: Nystroms Tryckeri AB; 1998

Neural control of micturition

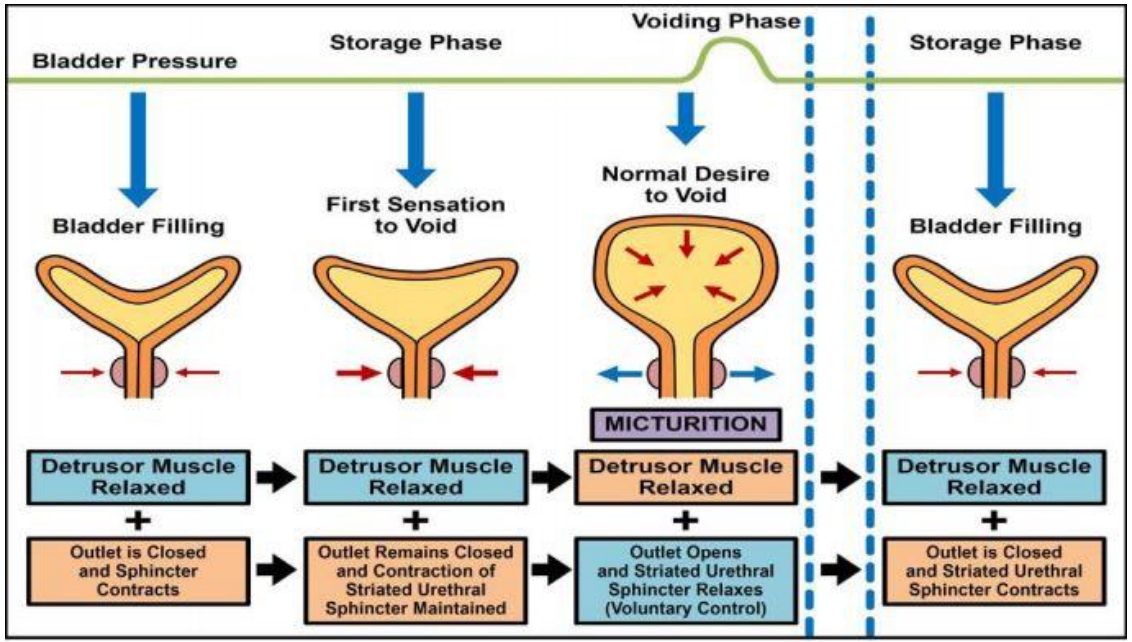




Arina Madan, et al. Management of lower urinary tract symptoms in Parkinson's disease in the neurology clinic. International Journal of Neuroscience, 127:12, 1136-1149

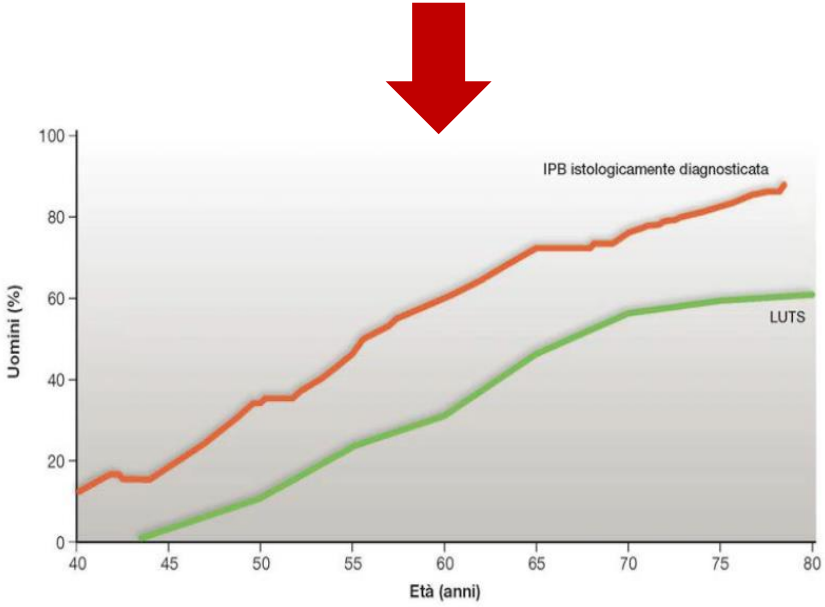
Control of micturition

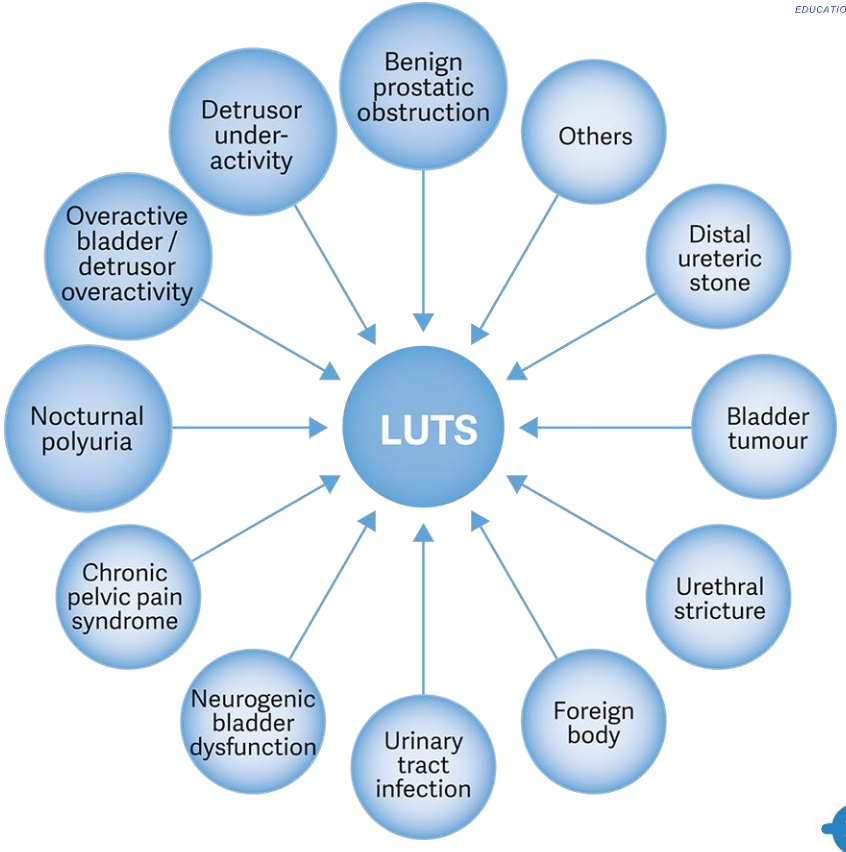
The function of the lower urinary tract depends on a complex neural control system located in the brain, the spinal cord and the anatomical structures.



Causes of male lower urinary tract symptoms (LUTS)

Correlation between LUTS and histological diagnosis of IPB with increasing age

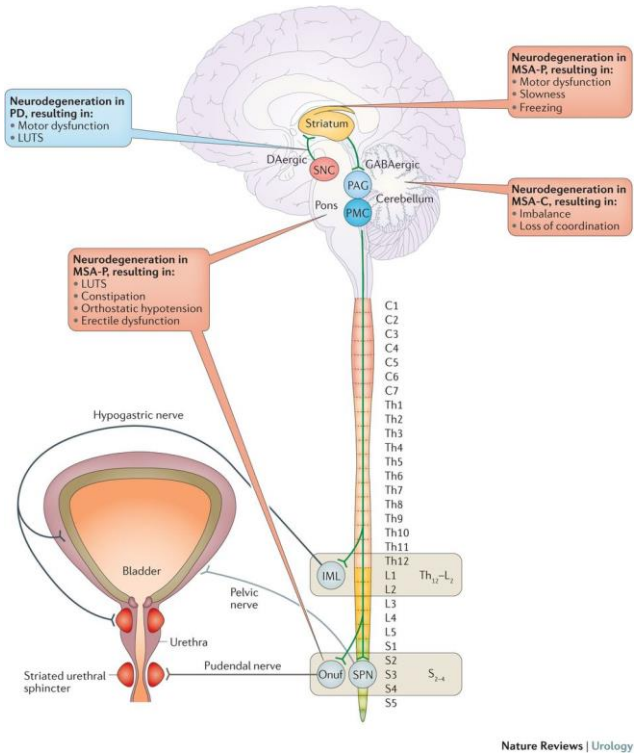




Non-neurogenic Male LUTS - EAU Guidelines 2020

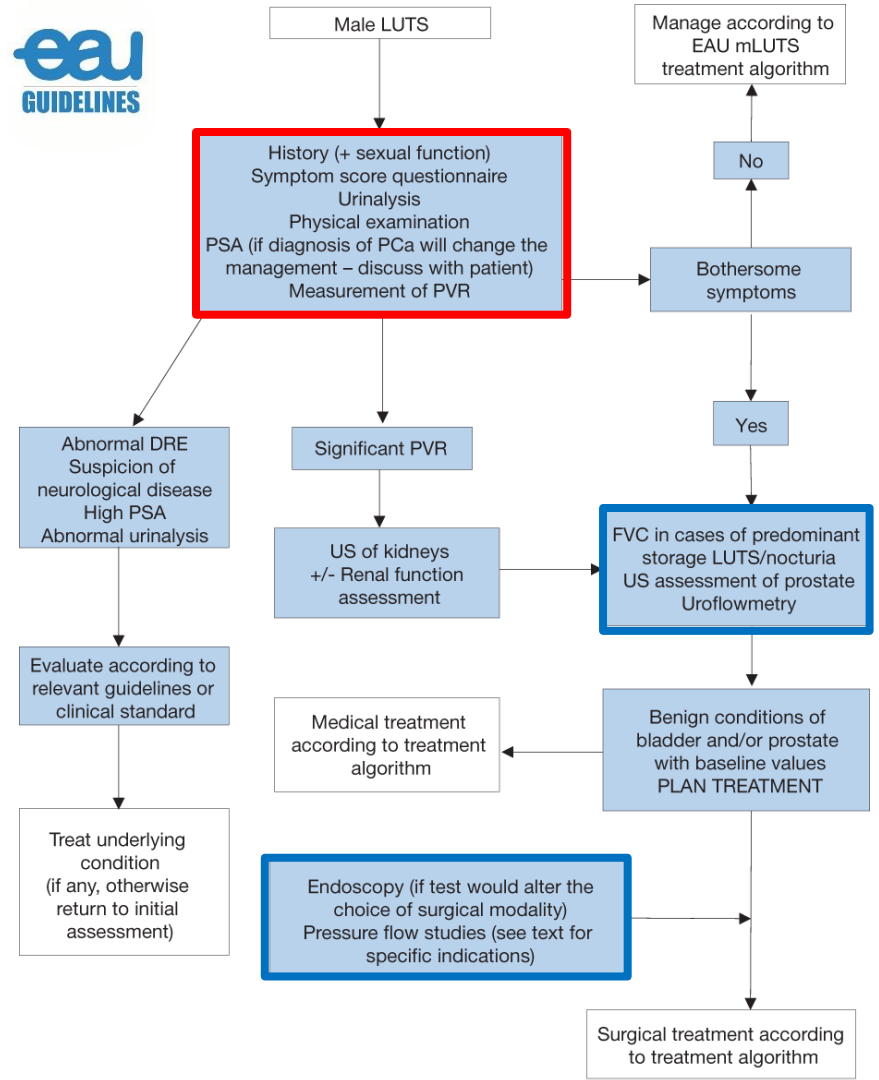
Which are Symptoms?

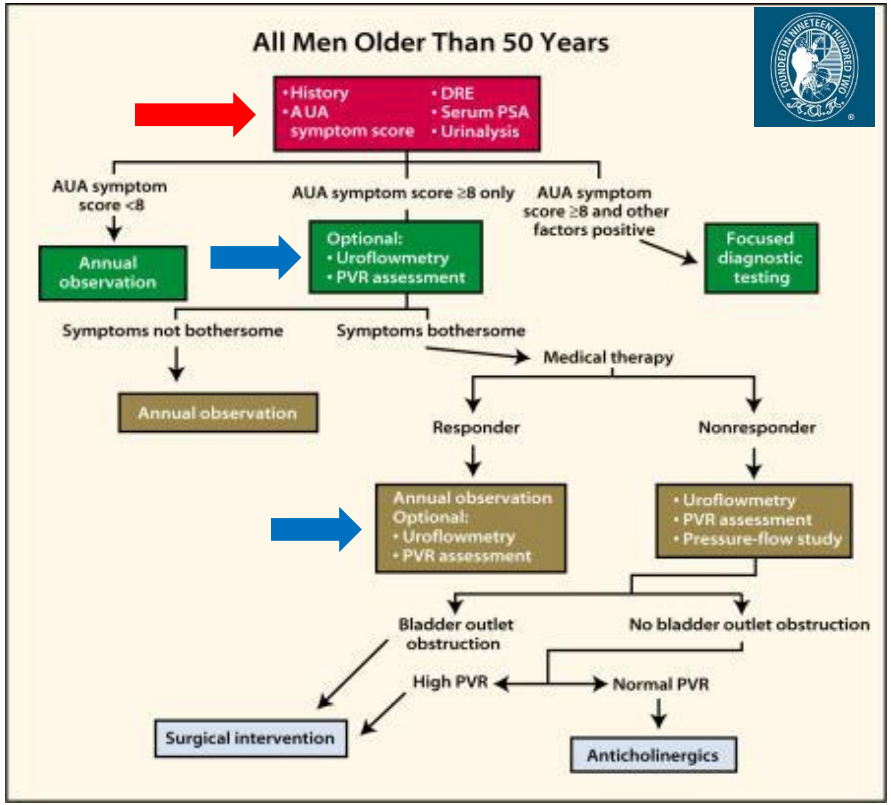
	Symptoms
Bladder storage symptoms (irritative symptoms)	Urinary Frequency Urgency Overactive bladder syndrome Nocturia Urinary incontinence Stress incontinence Urgency incontinence Nocturnal enuresis
Voiding symptoms (obstructive symptoms)	Hesitancy Slow stream Intermittency Straining to void Feeling of incomplete bladder emptying Post micturition leak Position dependent micturition Urinary retention



Non-neurogenic Male LUTS - EAU Guidelines 2020

Assessment algorithm of LUTS in men aged 40 years or older





Introduction

Symptomatic evaluation of urinary tract dysfunction is difficult since the bladder often proves to be an **‘unreliable witness’**

- because of subjective bias from both the patient and the clinician
- because there is considerable overlap between the symptoms that occur from different disorders.

Urodynamic techniques are objective investigations developed to clarify these symptoms.

Chapple, Christopher R. *Urodynamics Made Easy*. Elsevier Health Sciences 2019.

Definition

Urodynamics is the study of pressure and flow relationships during the storage and transport of urine within the urinary tract

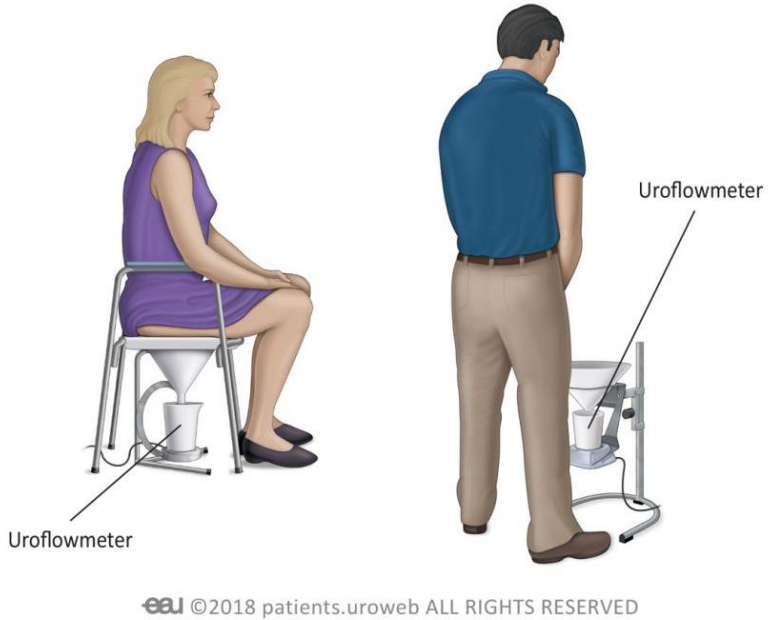
Storage	Voiding
Low Pressure Stable Bladder Adjustment of sphincter// End Filling desire to void Empty of Upper Urinary Tract Low pressure in Upper Urinary Tract	Voluntary Start Powerful stream No Post Void Residual Coordination of detrusor-contraction and relaxation of pelvic floor Capable of interruption of flow
Investigations Frequency/Volume Chart Filling Cystometry Urethral Pressure Profile	**Investigations** Frequency/Volume Chart Uroflow Full Urodynamic Study

Chapple, MacDiarmid and Patel 2009

Definition

The term urodynamics encompasses a variety of complementary techniques of varying complexity

Complexity of technique	Technique
Simple – voiding diary	Micturition/time chart Frequency/volume chart Bladder diary
Simple – investigation	Pad testing Uroflowmetry ± ultrasound residual Ultrasound cystodynamography Intravenous urodynamography
Pressure/flow studies (see Chapter 4)	Cystometry Leak point measurements Video urodynamics Ambulatory urodynamics
Complex – investigation	Urethral pressure measurement Neurophysiological investigation Upper tract urodynamics (Whitaker test)



Chapple, MacDiarmid and Patel 2009

Aims of Urodynamic investigations

- Reproduce the patient's symptoms
- Answer specific clinical questions
- Establish a precise diagnosis
- Determine the severity of the condition
- Plan further investigations or therapies

Voiding Problems

Benign Prostatic Hypertension-BPH
Pelvic Organ Prolapse-POP
Urethral Strictures
Pelvic Floor Dysfunction
Detrusor Sphincter Dyssynergia
Hypocontractile Bladder (residue formation and recurrent UTIs)
Neurogenic Bladder

Storage Problems

OAB wet (Sensory urge)-incontinence
OAB Dry (Sensory urge) - Reduced Capacity
Bladder Outlet Obstruction - BPH POP - Pelvic Organ Prolapse
Stricture
Reduced Compliance
Reflux
Bladder Ca
Interstitial Cystitis and other bladder inflammatory conditions

Chapple, Christopher R. *Urodynamics Made Easy*. Elsevier Health Sciences 2019.

Voiding diaries

Simplest of all urodynamic assessments

They provide an important natural urodynamic record of bladder function.

Voiding diaries are **simple, noninvasive** tools which frequently form part of the initial evaluation of patients complaining of lower urinary tract symptoms (LUTS), particularly those who have storage symptoms such as increased urinary frequency, incontinence or nocturia.

Voiding diaries

Several different diaries have been defined by the ICS:

- Micturition time chart – records only the times that voids occur with no volumetric data

- Frequency/volume chart (FVC) – records the time and volume of each micturition

- Bladder diary – records the time and volume of each micturition

24 Hour Bladder Diary Date ___/___/_____

Time	Intake/Fluids		Urinated in the toilet		Accidental leakage of urine		
	Amount (ml)	Type	Number *(how many times did you "pee" during the hour)*	Urine amount (ml)	Intensity (1-4)*	Presence of urgency (yes/no)	Activity *(what were you doing at the time of leakage)*
Please indicate the time when you woke and slept							
6 am							
7 am							
8 am							
9 am							
10 am							
11 am							
12 am							
1 pm							
2 pm							
3 pm							
4 pm							
5 pm							
6 pm							
7 pm							
8 pm							
9 pm							
10 pm							
11 pm							
12 pm							
1 am							
2 am							
3 am							
4 am							
5 am							

* **1** – few drops; **2** – soaked pad; **3** – soaked pad and underwear; **4** – soaked clothing

Pad Testing

Aims of the pad weight testing

- Qualitative assessment (continent vs incontinent)
- Quantitative assessment (how much)

Principle of the pad weight testing

- weight of the pads before and after test
- weight gain in g = urine loss in mls

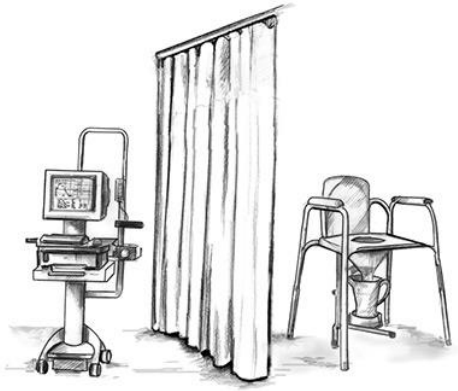
This test is particularly useful to **confirm the presence of incontinence when other tests** (e.g. pressure/flow uro-dynamics) **have failed** to de-monstrate any urinary leakage.

1 hour Pad test (ICS)

Time in minutes	Investigator	Patiënt
0	Apply pad with known weight	Drinks 500 ml saltfree liquid (water) Sits and rests
30		Walk around and take some stairs
45		Sit / stand x 10 Cough x 10 Run x 1 minute Pick-up things from floor Wash hands x 1 minuut
60	Take away pad and weight	Patiënt voids: Measure the volume 

Uroflowmetry

Uroflowmetry is a noninvasive and inexpensive test that gives great information regarding **voiding function** by measuring the rate of flow of voided urine.



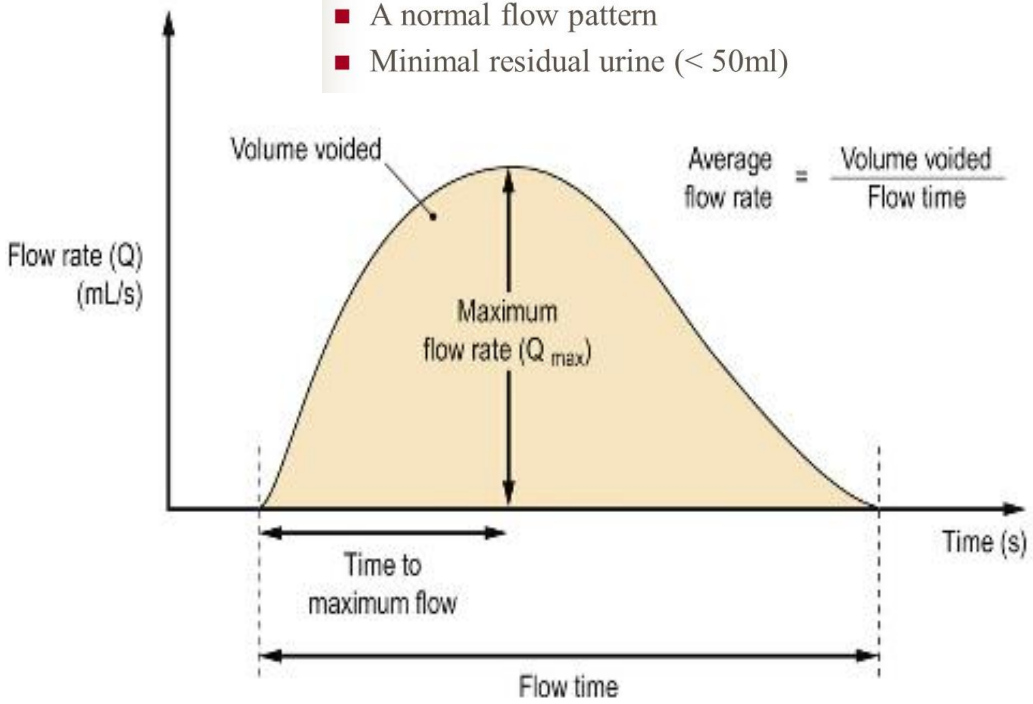
- It supports the diagnosis of bladder outflow obstruction (BOO) or detrusor underactivity.
- It identifies those patients who require more extensive uro-dynamic evaluation.

- It is an excellent screening tool for BOO and it is often the first-line screening investigation for most patients with suspected voiding dysfunction.

Uroflowmetry

- strength of detrusor contraction (detrusor contractility)
- presence of BOO
- adequacy of relaxation of the sphincter mechanisms
- patency of the urethra
- compensatory mechanisms such as abdominal straining

- Qmax ≥ 15 ml/s in men
- Qmax ≥ 20 ml/s in women
- Tqmax is < 1/3 of flow time
- Voided volume 200 –500 ml
- A normal flow pattern
- Minimal residual urine (< 50ml)



Uroflowmetry

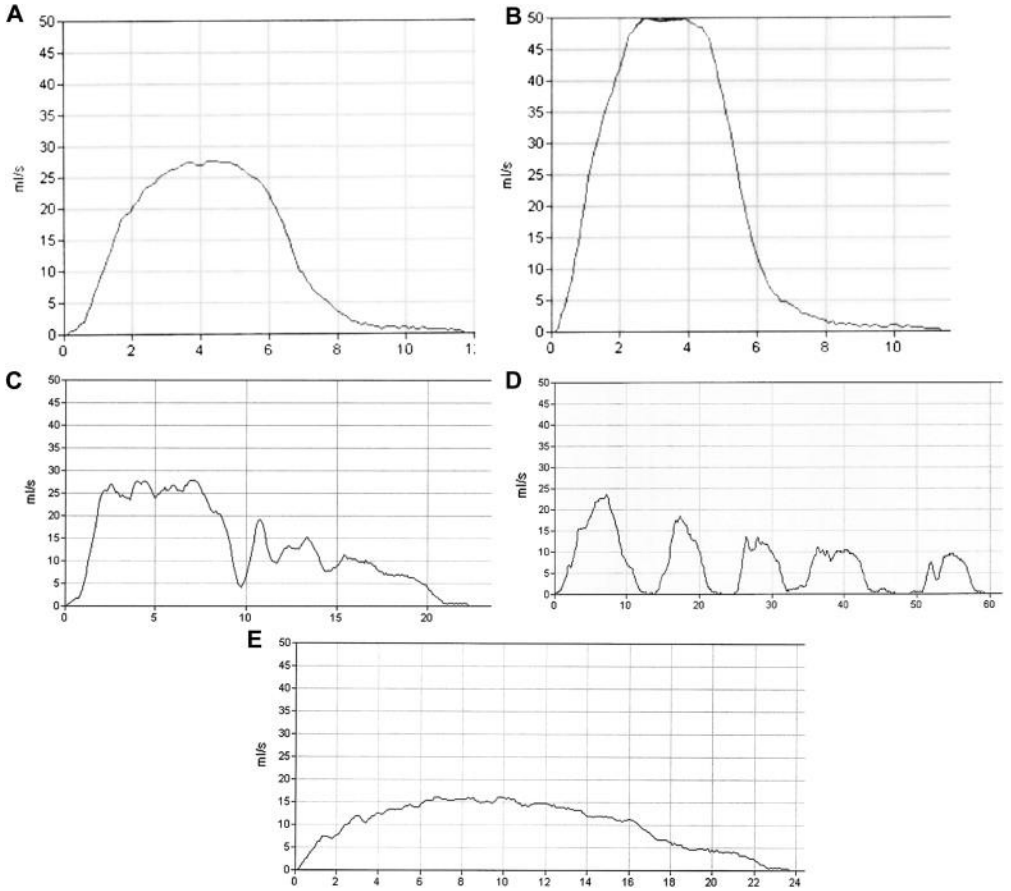


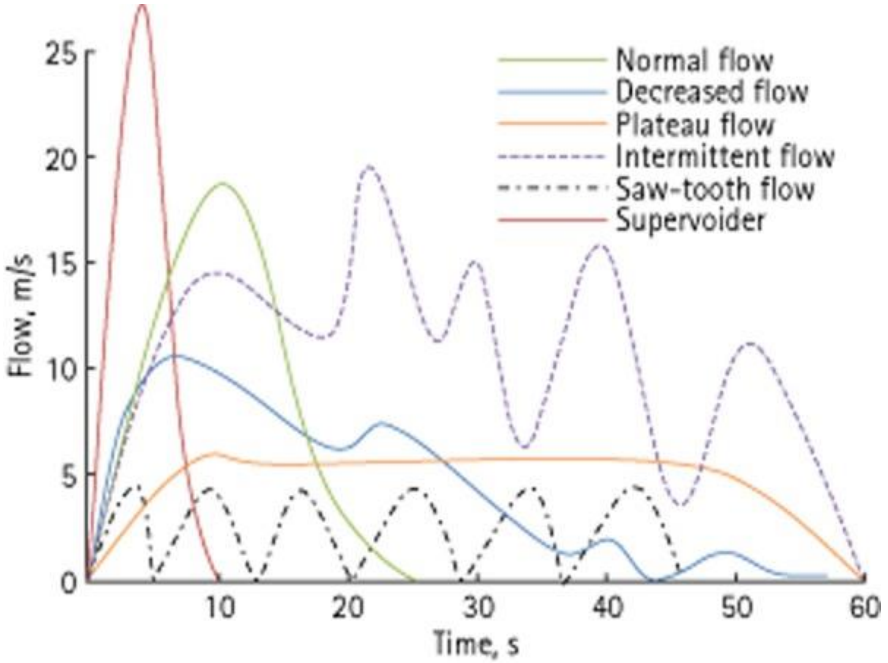
Fig. 3.4 Characteristic flow patterns. (a) Normal – there is rapid change before and after the peak flow. (b) Fast bladder – an exaggeration of normal associated with high pre-micturition pressure and seen in cases of detrusor overactivity. (c) Prolonged flow – associated with out-flow obstruction. (d) Intermittent flow – resulting from abdominal straining to compensate for poor detrusor contractility; a similar picture may be seen with urethral overactivity (detrusor sphincter dyssynergia or dysfunc-tional voiding). (e) Classic pattern of a urethral stricture with a long plateau.

Uroflowmetry

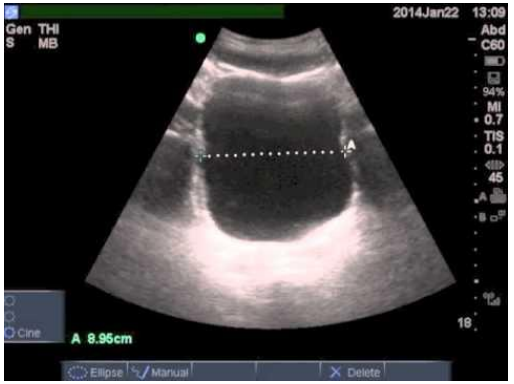
A normal flow rate does not exclude the presence of bladder outflow obstruction (BOO)

Uroflowmetry is performed to detect the presence and severity of BOO. Particularly in the early stages of obstruction, there may be compensatory increase in the voiding pressure generated by the detrusor muscle, thus overcoming the obstruction. Normal flow voiding (> 1 5 mL/s) occurs in approximately 7–15% of patients with BOO.

A Qmax less than 12 mL/s is generally considered abnormal in men older than 60 years; data suggest that approximately 90% of men with lower urinary tract symptoms and a Qmax less than 10 mL/s are obstructed on pressure/flow studies.



Uroflowmetry



Summary of evidence	LE
The diagnostic accuracy of uroflowmetry for detecting BOO varies considerably and is substantially influenced by threshold values. Specificity can be improved by repeated flow rate testing.	2b
Monitoring of changes in PVR over time may allow for identification of patients at risk of AUR.	3

Recommendations	Strength rating
Perform uroflowmetry in the initial assessment of male LUTS.	Weak
Perform uroflowmetry prior to medical or invasive treatment.	Strong

An **elevated PVR** may represent **obstruction** or, more commonly, is a surrogate marker for **detrusor underactivity**

ALWAYS COMBINE **URF** with **PVR** !!

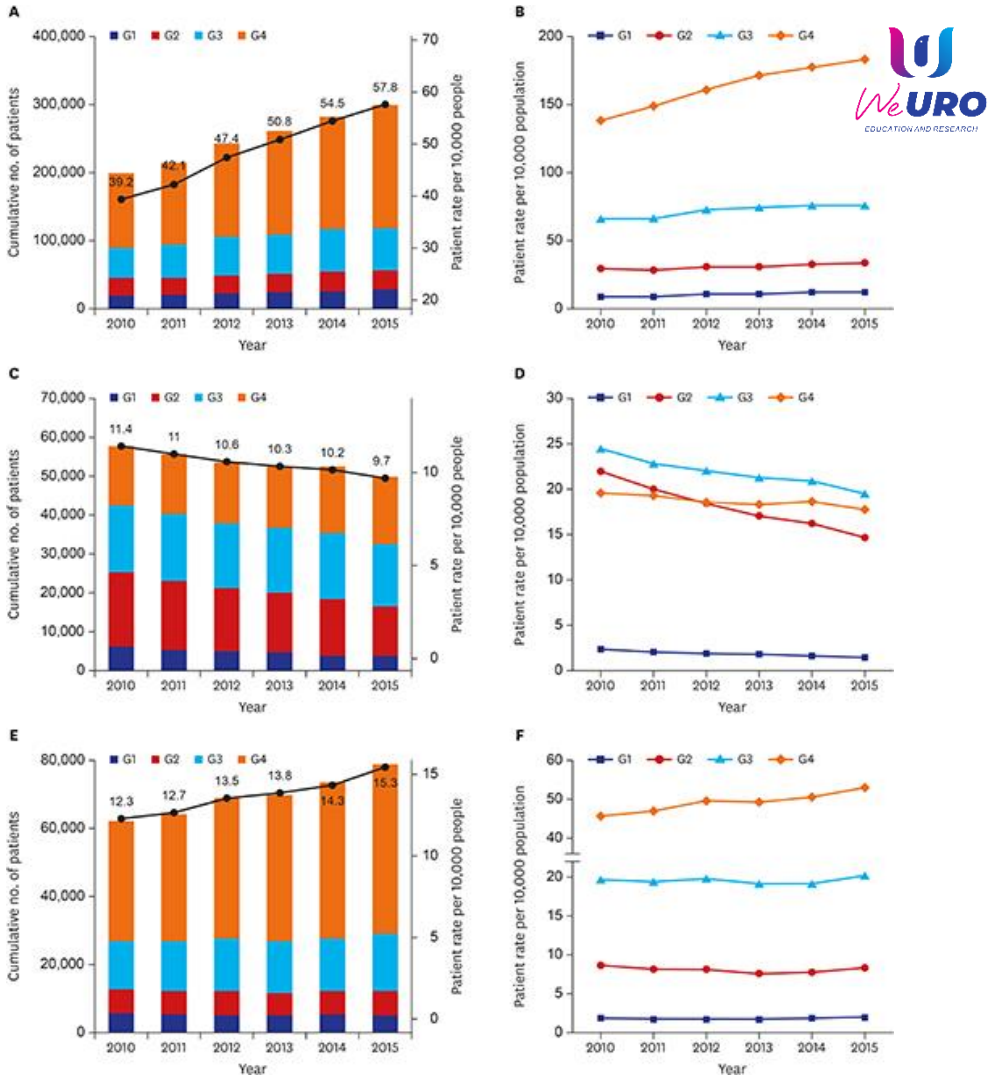
National Trend of Uroflowmetry, Urodynamic Study and Cystoscopy Considering the Change in the Population Structure in Korea from 2010 to 2015

Min Jung Baek,[1*] Suyeon Park,[2*] Ki Hyun Kim,[3] Yune Hyoun Kim,[3] Woo Ki Kim,[4] Hwa Yeon Sun,[5] and Jae Heon Kim[5]

The current trend of uroflowmetry is increasing according to both years and adjustment of age shifting. Possible reasons for the occurrence of this phenomenon include **simplicity and rapidity in both performance and interpretation.**

For urodynamic test, **the current trend of decreasing pattern according to age and age shifting is ironic.**

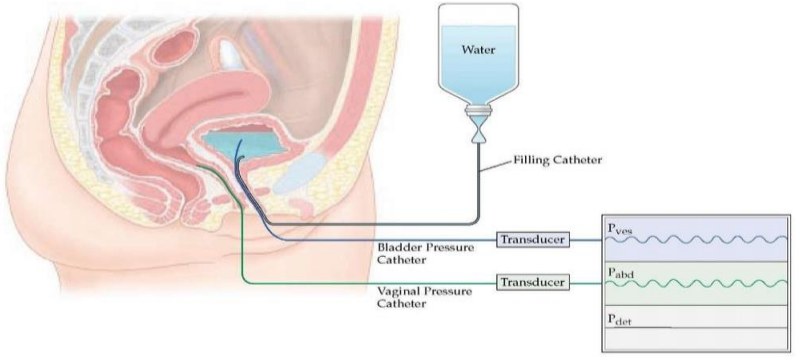
JKMS 2017

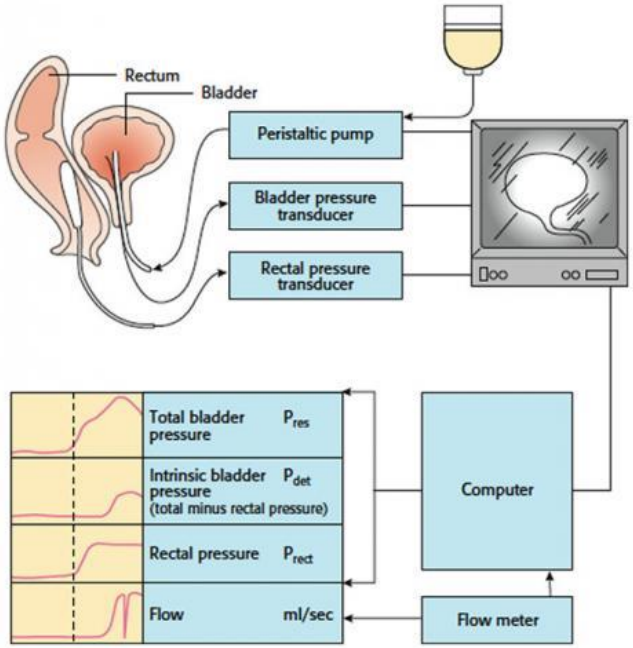


Pressure / Flow Cystometry

Principal advantage of pressure/flow studies is that the simultaneous measurement of bladder pressure and voiding function allows the site of dysfunction to be localized specifically to either the bladder or the bladder outlet/urethra.

Cystometry provides much useful information regarding the function of the lower urinary tract during both the storage and voiding phases of the bladder cycle.





Pressure / Flow Cystometry

Principal aim is to **reproduce the patient's symptoms** and to **correlate the symptoms with the underlying urodynamic findings.**

Specific urodynamics questions:

- diagnosis;
- disease severity;
- most significant abnormality;
- future management options;
- potential postoperative problems;
- results of treatment;
- future problems (surveillance) in at-risk groups such as patients with neurological dysfunction.

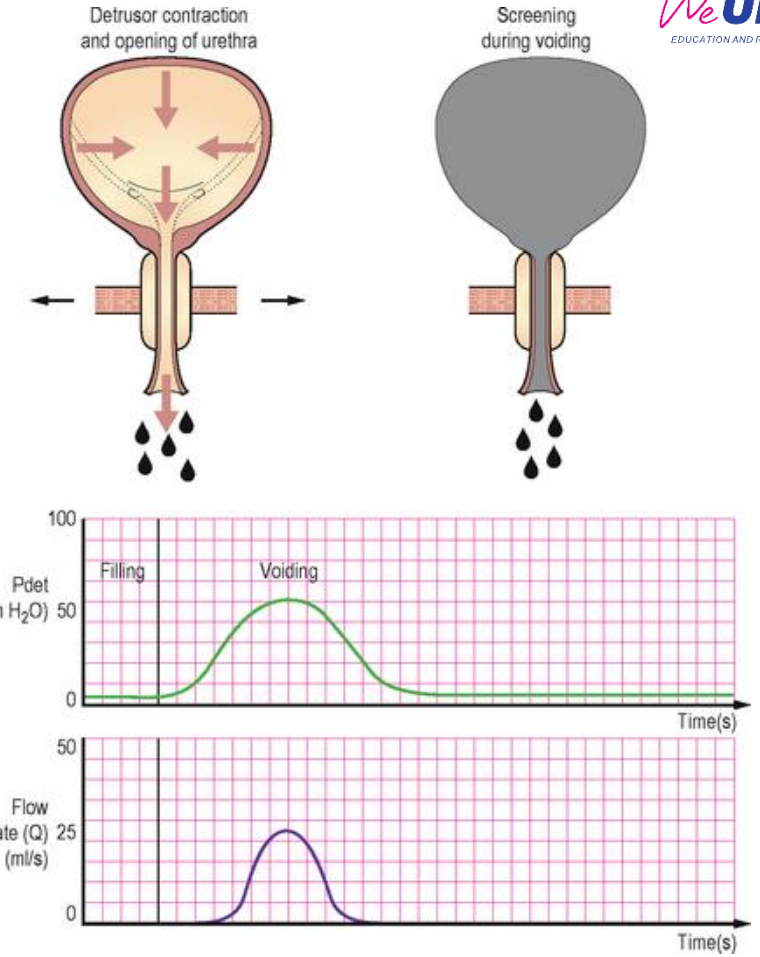
Pressure / Flow Cystometry

Urodynamics is a diagnostic exam that consists of a series of tests aimed to obtaining functional information on filling, emptying and bladder storage capacity.

WHETHER THE SYMPTOMS OF THE FILLING PHASE PREDOMINATE (OAB) AND THERE IS NO EVIDENCE OF OBSTRUCTION

OR

IN THE PRESENCE OF SYMPTOMS OF EMPTYING BLADDER WITHOUT SIGNS OF OBSTRUCTION



Pressure / Flow Cystometry

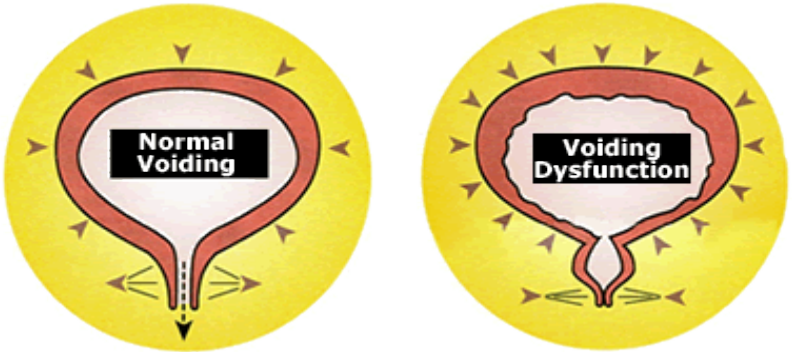
- The pressure-flow study is recommended before taking invasive therapies in men with Qmax values above 10 ml/sec. For lower Qmax values the presence of an obstructive disease is more likely and the pressure-flow study is not necessary.
- Pressure-flow studies demonstrate proven effectiveness in the assessment of the patient prior to taking invasive therapies or where a precise diagnosis of cervical - urethral obstruction is important.
- The pressure-flow study is the only effective method to distinguish low urinary flows due to detrusor hypoactivity from those due to cervical-urethral obstruction. This is achieved by relating detrusor pressure at the time of maximum urinary flow to the maximum urinary flow itself.

The most important parameter in the pressure-flow study is detrusorial pressure (Pdet) at maximum urinary flow (Qmax).

Pressure / Flow Cystometry

Causes of voiding difficulty in men are:

- **Anatomical outflow obstruction:**
  - obstruction at the level of the prostate (most common);
  - obstruction at the level of the bladder neck;
  - obstruction due to a urethral stricture;
  - extrinsic compression of bladder or urethra.



- **Functional obstruction:**
  - overactivity of the bladder neck/ urethral muscles causing dys-synergy with the detrusor contr-action.

- **Detrusor underactivity:**
  - primary;
  - secondary to outflow obstruction or a neurogenic disorder.

Pressure / Flow Cystometry

Possible findings during urodynamic testing of patients with BOO

Voiding diaries	Increased daytime frequency Nocturia
Uroflowmetry and PVR	Initial hesitancy Prolonged flow time and voiding time Low Q_{max} (< 15 mL/s) Low average flow rate Prolonged time to maximum flow Prolonged declining termination of flow Intermittent flow Raised PVR Characteristic low flow rate, long plateau in urethral stricture
Pressure/flow cystometry (Figs. 6.4 and 6.5)	High opening pressure, prolonged opening time High maximum detrusor pressure (often > 60–100 cm H_2O) High pressure at maximum flow High closing pressure Low Q_{max} (< 15 mL/s) Raised PVR Prolonged flow time Intermittent flow Abdominal straining to aid voiding Stop test – the isometric pressure contraction is often high (> 50 cm H_2O), rarely able to perform due to the force of the detrusor contraction
Video urodynamics	Level of obstruction Calibre of urethra Stop test – trapping in prostatic urethra due to bladder neck obstruction Vesicoureteric reflux Hydronephrosis Trabeculation Diverticula

Urodynamic findings in bladder outflow obstruction

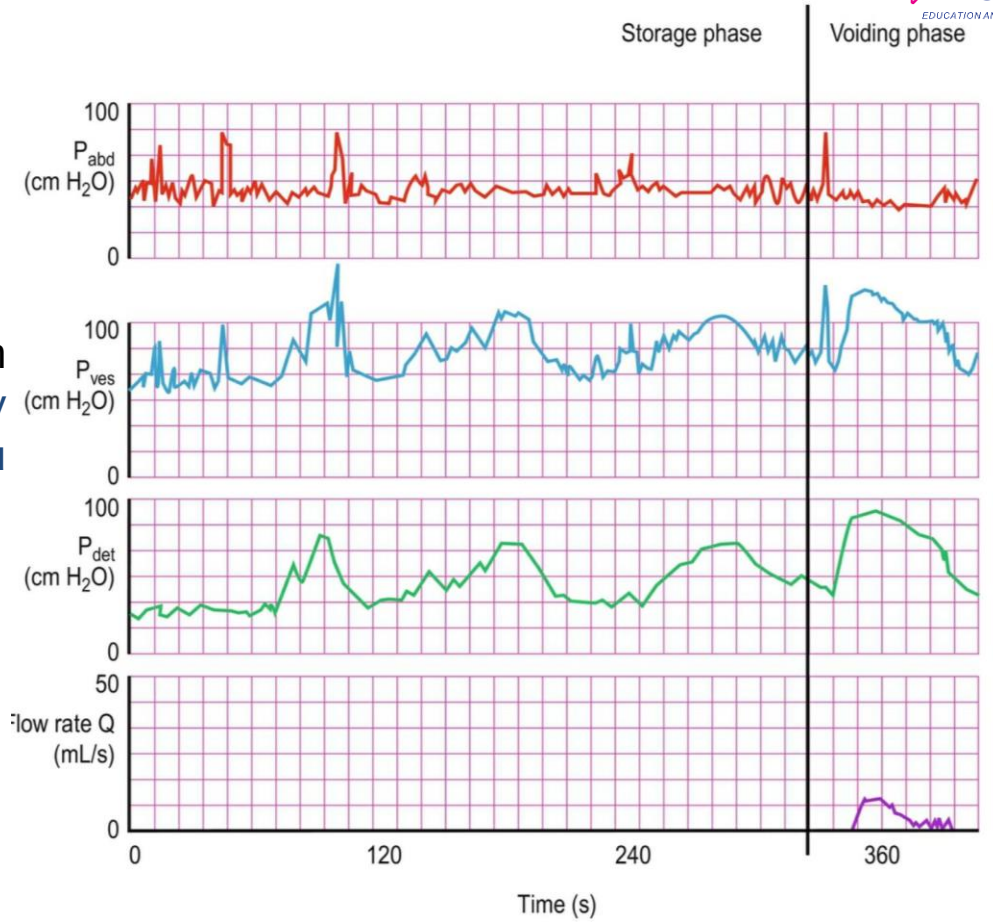
- Patients with a **detrusor pressure greater than 60 cmH2O** associated with a **Qmax less than 10 mL/s** are **urodynamically obstructed**.
- The detrusor pressure often reaches abnormally high levels (**approaching or > 100 cm H2O**) in an attempt to expel the urine through the obstruction.
- Yet the flow rate remains low (often < 8 mL/s) despite the elevated pressures (**high pressure, low flow**).

But in many cases the findings are more equivocal

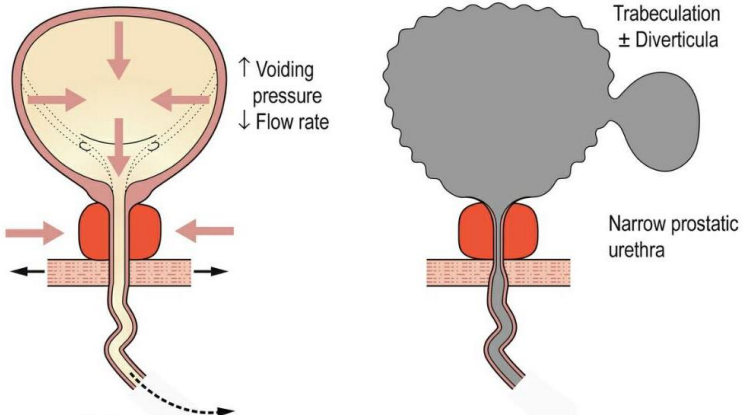
- Elevated detrusor pressures with and without abdominal straining overcome the obstruction leading to a normal flow rate (**high pressure, normal flow**).
- The detrusor has not yet accommodated to the BOO and generates only normal pressures. The result is poor flow (**normal/low pressure, low flow**).

Urodynamic findings in bladder outflow obstruction

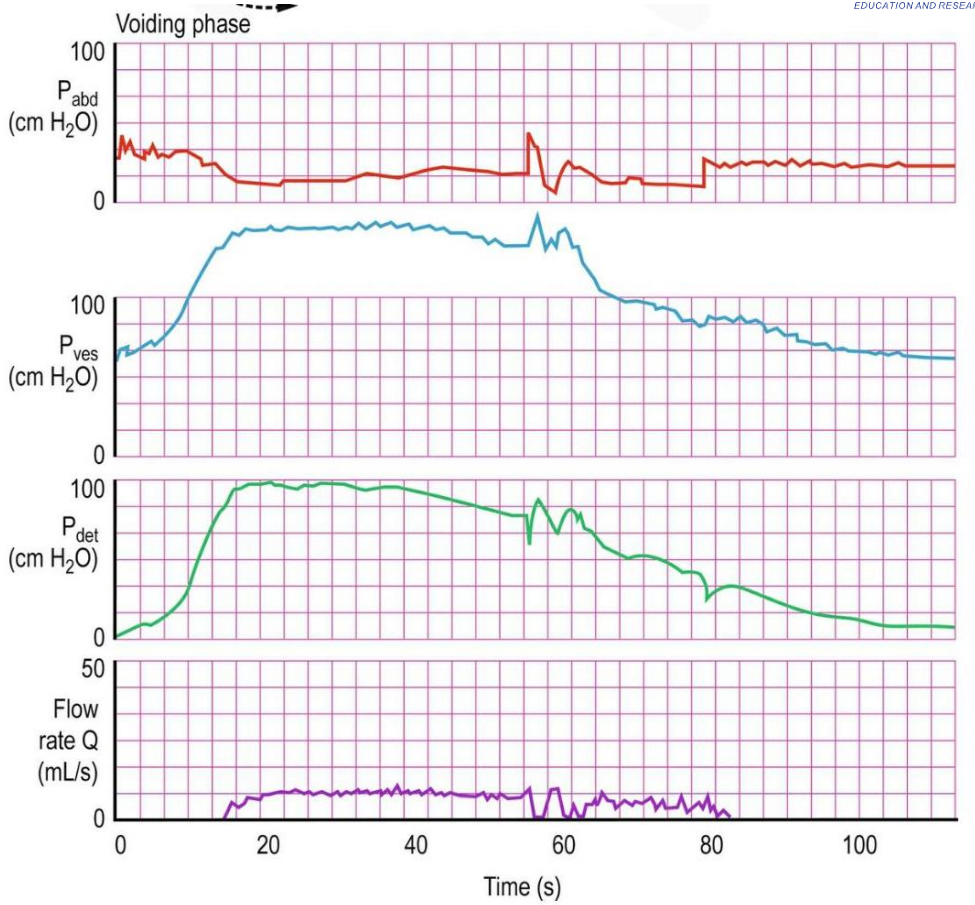
Cystometry and Pressure/flow study in patient with both detrusor overactivity during filling and bladder outflow obstruction during voiding.
This a common pattern, as patients may have coexisting conditions.



Urodynamic findings in bladder outflow obstruction

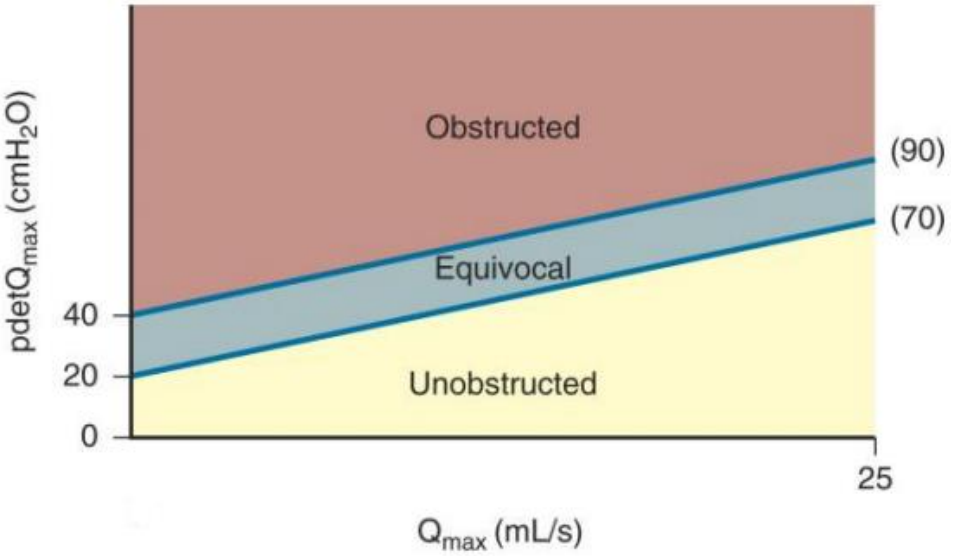


Typical pressure/flow study in patien t suffering from bladder outflow obstr uction. Detrusor pressure at flow max (PdetQmax=100cmH2O) confirms high grade obstruction.



Urodynamic findings in bladder outflow obstruction

To aid in determining if BOO is present, the International Continence Society (ICS) pressure/flow nomogram can be used to calculate the bladder outflow obstruction index (BOOI) by plotting Qmax against Pdet Qmax.



The nomogram allows the bladder outflow obstruction index to be easily calculated and the patient categorized as obstructed, unobstructed or equivocal. Adjustment must be made for flow rate delay before using the nomogram.

Platinum Priority – Guidelines
Editorial by XXX on pp. x–y of this issue

Systematic Review of the Performance of Noninvasive Tests in Diagnosing Bladder Outlet Obstruction in Men with Lower Urinary Tract Symptoms

Sachin Malde[a], Arjun K. Nambiar[b], Roland Umbach[c], Thomas B. Lam[d,e], Thorsten Bach[f], Alexander Bachmann[g], Marcus J. Drake[h], Mauro Gacci[i], Christian Gratzke[j], Stephan Madersbacher[k], Charalampos Mamoulakis[l], Kari A.O. Tikkinen[m], Stavros Gravas[n,], for the European Association of Urology Non-neurogenic Male LUTS Guidelines Panel*

42 studies were selected and analyzed, for a total of over 4000 male patients (>18 yr) with LUTS.

The **purpose** of the Review was to **compare the diagnostic accuracy of 9 non-invasive tests** [Prostatic Volume, Intravescial Prostatic Protrusion (IPP), Detrusor/Bladder wall thickness, Uroflometry, Ultrasound-estimeted bladder weight (UEBW), Doppler ultrasound, Penile cuff test (PCT), External condom catheter, Near-infrared spectroscopy (NIRS)] **to the urodynamic examination**

Results

Several non-invasive tests are promising from a diagnostic point of view but **the urodynamic examination remains the gold standard in the diagnosis of BOO.**

Study	Pts (n)	Study design	Index test	Threshold value	Blinding	BOO definition for reference standard
Abdel-Aal 2011 [6]	85	NRE	DWT	2 mm	Yes	BOOI >40
			IPP	8 mm		
			Combination IPP + DWT	8 mm + 2 mm		
Aganovic 2004 [7]	102	NRE	Uroflowmetry	10 ml/s	NR	LPURR >2 or >3
						LPURR >2 + URA >29
						Q_{max} <15 and $P_{det}Q_{max}$ >50

Study	Pts (n)	Study design	Index test	Threshold value	Blinding	BOO definition for reference standard
Aganovic 2012 [8]	111	NRE	IPP	10 mm	NR	BOOI >40
			BWT	5 mm		
Aganovic 2012 [9]	112	NRE	IPP	12 mm	NR	BOOI >40
			BOON	~27.2		BOOI >40
			BOON	~27.2		URA >29
			Combination IPP + BOON	10 mm, ~30		BOOI >40
			BOON2	~47.4 and ~50		URA >29
Belenky 2003 [10]	29	NRE	Doppler ultrasound	RI T > 0.05	Yes	BOOI >40
Bianchi 2014 [11]	48	NRE	PCT	Griffiths nomogram	No	BOOI >40
Borboe-Rasmussen 1999 [12]	29	NRE	Uroflowmetry	10 ml/s	No	BOOI >40
Chia 2003 [13]	200	NRE	Uroflowmetry	10 ml/s	Yes	BOOI >40
			IPP	10 mm		
Chung 2010 [14]	33	NRE	NIRS pattern on free flow	Downward pattern	No	BOOI >40
			NIRS pattern on pressure-flow study	Downward pattern		
Dicuio 2005 [15]	25	NRE	IPP	10 mm	No	DAMPF score
El Saied 2013 [16]	50	NRE	DWT	2 mm	Yes	BOOI >40
			Uroflowmetry	10 ml/s		
			Prostate volume	25 ml		
Franco 2010 [17]	100	NRE	IPP	12 mm	Yes	BOOI >40
			DWT	6 mm		
			Prostate height	40 mm		
			Prostate volume	38 ml		
Griffiths 2005 [18]	144	NRE	PCT	Griffiths nomogram	No	BOOI >40
			Uroflowmetry	10 ml/s		
Han 2011 [19]	193	NRE	Corrected UEBW (UEBW/BSA)	27.86 g	NR	BOOI >40
Harding 2004 [20]	101	NRE	PCT	PCR Index 160%	Yes	BOOI >40
			Uroflowmetry	10 ml/s		
Hirayama 2002 [21]	36	NRE	Uroflowmetry	10 ml/s	NR	BOOI >40
Kawanami 2015 [22]	51	NRE	PCT	Griffiths nomogram	NR	BOOI >40
Kepin 2007 [23]	206	RS	IPP	8.5	NR	BOOI >40
Kessler 2006 [24]	102	NRE	DWT	1.5, 2, 2.5, 2.9 mm	No	BOOI >40
Kojima 1997 [25]	65	NRE	UEBW	35 g	No	BOOI >40
Ku 2009 [26]	212	NRE	Uroflowmetry	10, 12, 15 ml/s	No	BOOI >40
			Residual fraction	10%, 20%, 30%		
Kuo 1999 [27]	324	NRE	Uroflowmetry	10 ml/s	No	$P_{det}Q_{max}$ >50
Lim 2006 [28]	95	NRE	IPP	10 mm	NR	BOOI >40
			Prostate volume	40 ml		
MacNab 2008 [29]	55	NRE	NIRS	NIRS algorithm	No	Not defined
Madersbacher 1997 [30]	253	NRE	Uroflowmetry	5 ml/s	No	LPURR >2
Manieri 1998 [31]	170	NRE	BWT	5 mm	Yes	URA >29
Matulewicz 2015 [32]	19	NRE	PCT	Modified ICS nomogram	No	NR
Oelke 2002 [34]	70	NRE	DWT	2 mm	NR	CHEEE
			Uroflowmetry	15 ml/s		
Oelke 2007 [33]	160	NRE	DWT	2 mm	Yes	BOOI >40
			Uroflowmetry	10 and 15 ml/s		
Ozawa 2000 [35]	22	NRE	Doppler ultrasound	VR >1.6	NR	BOOI >40
Pascual 2011 [36]	39	NRE	MLL	10.5 mm	No	BOOI >40
Pel 2002 [37]	56	NRE	External condom catheter	$Q_{max}/P_{ves\ max}$	No	BOOI >40
Poulsen 1994 [38]	153	NRE	Uroflowmetry	10 ml/s	No	BOOI >40
Reis 2008 [39]	42	NRE	IPP	10 and 5 mm	Yes	BOOI >40
Reynard 1996 [40]	148	NRE	Uroflowmetry	10 ml/s 1st void	No	BOOI >40
			Uroflowmetry – multiple	10 ml/s 4th void		
Reynard 1998 [41]	897	NRE	Uroflowmetry	10 ml/s	No	Shafer nomogram
Salinas 2003 [42]	93	NRE	PCT	Nomogram described	Yes	BOOI >40
Soehnen 2010 [43]	64	NRE	NIRS	CART model	No	BOOI >40
Sullivan 2000 [44]	90	NRE	Penile compression release	PCR 100%	NR	VPC >5 cm H_2O
Watanabe 2002 [45]	51	NRE	Prostate volume and MW	30 ml and 0.8	No	LPURR ≥3
Yuri 2012 [46]	53	NRE	NIRS	NIRS algorithm	No	BOOI >40
Zhang 2013 [47]	87	NRE	NIRS	NIRS algorithm	Yes	BOOI >40
			Uroflowmetry + PVR	10 ml/s and 100 ml		

BOOI = bladder outflow obstruction index; BOON = BOO number; BSA = body surface area; BWT = bladder wall thickness; CART = classification and regression tree; DWT = detrusor wall thickness; DAMPF = detrusor-adjusted mean PURR factor; ICS = International Continence Society; LPURR = linear passive urethral resistance relation; MLL = middle lobe length; NRE = nonrandomised experimental; NIRS = near-infrared spectroscopy; NR = not reported; NPV = negative predictive value; PCR = penile compression ratio; PCT = penile cuff test; $P_{det}Q_{max}$ = detrusor pressure at Q_{max}; $P_{ves\ max}$ = maximum external pressure; PPV = positive predictive value; Pts = patients; Q_{max} = maximum flow; RI = resistive index; RS = retrospective; UEBW = ultrasound-estimated bladder weight; URA = urethral resistance algorithm; VPC = voiding proflowmetry gradient across the bladder neck and prostatic urethra in the absence of distal obstruction; VR = velocity ratio.

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Do Patients With Symptoms and Signs of Lower Urinary Tract Dysfunction Need a Urodynamic Diagnosis? ICI-RS 2013

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The usefulness of urodynamic testing in patients with LUTS was evaluated.

Two patient cohorts were selected for the study:

- young men (without PBE);
- elderly men (with BPE).

The two cohorts were further «stereotyped» in seven categories: signs and symptoms of SUI, mixed incontinence symptoms (SUI AOB), urgency and frequency (AOB UI), symptoms of emptying, failure of initial treatment for LUTS, pain and/or UTI, neurological LUTD (NLUTD).

The indication for urodynamic examination is maximum in Elderly patients with emptying symptoms. The challenge for the future is to select the best possible combination of invasive tests and not urodynamic examination to better stratify patients and adapt treatment.

TABLE I. Grade of Supporting Evidence[a] for the Use of Tests (Rows) When the Patient (Elderly Male Patient, with a Large Prostate or History of (Radical) Prostatectomy) presents with any of the "LUTD Syndromes" (Columns)

Elderly male	Symptoms and signs SUI/PP-I	Mixed "imperfect" UI/ PP-I	Urgency & frequency OAB ± incontinence	Voiding symptoms (BOO)	Failed initial treatment	Pain and - or UTI	Pt has relevant neurological abnormalities: NLUTD
Flow	Level 4	Level 4	Level 3b	Level 3b	Level 4	Level 4	No evidence
PVR	Level 4	Level 4	Level 3b	Level 3b	Level 4	Level 4	Level 3b
Cystometry	Level 4	Level 4	Level 4	Level 4	Level 4	Level 4	Level 3b
Pressure/flow	Level 4	Level 4	Level 4	Level 3b	Level 5	Level 5	If "DLPP" or if voiding: (dyssynergia) Level 3b
UPP	No evidence	Level 4	No evidence	No evidence	No evidence	Level 5	No evidence
Video	No evidence	No evidence	No evidence	Level 4	No evidence	No evidence	Level 3b
Surface EMG	No evidence	No evidence	No evidence	No evidence	No evidence	No evidence	Level 5
Ambulatory	No evidence	No evidence	No evidence	Level 5	No evidence	No evidence	Level 5

SUI, stress urinary incontinence; PP, post radical prostatectomy; OAB, overactive bladder; UTI, urinary tract infections; DLPP, detrusor leakpoint pressure; BOO, bladder outlet obstruction; PVR, post void residual.
[a]Oxford Centre of Evidence Medicine Levels of Evidence (March 2009).[10]

TABLE II. Grade of Supporting Evidence[a] for the Use of Tests (Rows) When the Patient (Young Adult Man; Presents with Small Prostate) presents with any of the "LUTD Syndromes" (Columns)

Young man: small prostate	Symptoms and signs SUI	Mixed "imperfect" symptoms	Urgency & frequency OAB ± incontinence	(Also) voiding symptoms	Failed initial treatment	Pain and - or UTI	Pt has relevant neurological abnormalities: NLUTD
Flow	Level 4	Level 4	Level 4	Level 4	Level 4	Level 4	No evidence
PVR	Level 4	Level 4	Level 4	Level 4	Level 4	Level 4	Level 3b
Cystometry	Level 4	Level 4	Level 4	Level 4	Level 4	Level 5	Level 3b
Pressure/flow	Level 5	Level 5	Level 5	Level 4	Level 4	Level 5	If "DLPP" or if voiding: (dyssynergia) Level 3b
UPP	No evidence	No evidence	No evidence	No evidence	No evidence	No evidence	No evidence
Video	No evidence	No evidence	No evidence	Level 4	Level 5	No evidence	Level 3b
Surface EMG	No evidence	No evidence	No evidence	Level 5	No evidence	No evidence	Level 5
Ambulatory	No evidence	No evidence	No evidence	Level 5	No evidence	No evidence	Level 5

SUI, stress urinary incontinence; OAB, overactive bladder; UTI, urinary tract infections; DLPP, detrusor leakpoint pressure; PVR, post void residual.
[a]Oxford Centre of Evidence Medicine Levels of Evidence (March 2009).[10]

The use of urodynamic testing in young patients is **still much discussed**

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The Value of Urodynamic Study for Diagnosing the Causes of Lower Urinary Tract Symptoms in Male Patients: A Study From Iran

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The usefulness of various urodynamic tests in male patients with LUTS was evaluated.

407 patients (average age 50,88 yr) between April 2011 and May 2013.

Each patient was subjected to a complete urodynamic examination (urofluxometry, filling phase, emptying phase, RPM measurement).

Table 1. Urodynamic Diagnosis

Disorder	No. (%)
Sensation disorder	139 (34.06)
Overactive bladder	95 (23.28)
Bladder outlet obstruction	52 (12.74)
Underactive detrusor	48 (12.0)
Detrusor external sphincter dyssynergia	13 (3.20)
Absent sensation	10 (2.45)
Urethral stricture	7 (1.73)
Normal	43 (10.54)

Most common disorders are:

- bladder sensation disorder (35%);
- overactive bladder (24%);
- bladder outlet obstruction (13%).

In 43 patients (11%) urodynamic examination was normal

If treatment is based exclusively on the symptoms of the patients it is ineffective. Therefore a functional study by urodynamic examination is necessary to discriminate the main pathology of the patient and set up a targeted therapy.

EAU Guidelines

4.12. Urodynamics

In male LUTS, the most widespread invasive urodynamic techniques employed are filling cystometry and pressure flow studies (PFS). The major goal of urodynamics is to explore the functional mechanisms of LUTS and to identify risk factors for adverse outcomes (for informed/shared decision-making). Most terms and conditions (e.g. DO, low compliance, BOO/BPO, DUA) are defined by urodynamic investigation.

Recommendations	LE	GR
PFS should be performed only in individual patients for specific indications prior to invasive treatment or when evaluation of the underlying pathophysiology of LUTS is warranted.	3	B
PFS should be performed in men who have had previous unsuccessful (invasive) treatment for LUTS.	3	B
When considering invasive treatment, PFS may be used for patients who cannot void > 150 mL.	3	C
When considering invasive therapy in men with bothersome, predominantly voiding LUTS, PFS may be performed in men with a PVR > 300 mL.	3	C
When considering invasive treatment in men with bothersome, predominantly voiding LUTS, PFS may be performed in men aged > 80 years.	3	C
When considering invasive treatment in men with bothersome, predominantly voiding LUTS, PFS should be performed in men aged < 50 years.	3	B

LUTS=lower urinary tract symptoms; PFS=pressure-flow studies, PVR=post-void residual.

Recommendation	LE	GR
None of the non-invasive tests in diagnosing BOO in men with LUTS can currently be recommended as an alternative for pressure-flow studies.	1a	B

Non-neurogenic Male LUTS - EAU 2020

Management del paziente affetto da iperplasia prostatica benigna