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TERMINOLOGY, CONSENSUS ARTICLE, BEST PRACTICE POLICIES

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The International Continence Society (ICS) report on the terminology for adult male lower urinary tract and pelvic floor symptoms and dysfunction

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Introduction: In the development of terminology of the lower urinary tract, due to its increasing complexity, the terminology for male lower urinary tract and pelvic floor symptoms and dysfunction needs to be updated using a male-specific approach and via a clinically-based consensus report.

Methods: This report combines the input of members of the Standardisation Committee of the International Continence Society (ICS) in a Working Group with recognized experts in the field, assisted by many external referees. Appropriate core clinical categories and a subclassification were developed to give a numeric coding to each definition. An extensive process of 22 rounds of internal and external review was developed to exhaustively examine each definition, with decision-making by collective opinion (consensus).

Results: A Terminology Report for male lower urinary tract and pelvic floor symptoms and dysfunction, encompassing around 390 separate definitions/ descriptors, has been developed. It is clinically-based with the most common diagnoses defined. Clarity and user-friendliness have been key aims to make it interpretable by practitioners and trainees in all the different specialty groups involved in male lower urinary tract and pelvic floor dysfunction. Male-specific imaging (ultrasound, radiology, CT, and MRI) has been a major addition whilst appropriate figures have been included to supplement and help clarify the text.

Conclusions: A consensus-based Terminology Report for male lower urinary tract and pelvic floor symptoms and dysfunction has been produced aimed at being a significant aid to clinical practice and a stimulus for research.

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INTRODUCTION

There is currently no single document addressing all elements required for diagnoses applicable to adult (fully grown and physically mature[1] – ***new***) male lower urinary tract and pelvic floor dysfunction. Indeed, the diagnostic entities themselves may have not been all completely defined. The term "diagnosis" is defined as "the determination of the nature of a disease; **clinical:** made from a study of the symptoms and signs of a disease[1]; "**laboratory:**" investigative options to be mentioned. Such a specific report would require a full outline of the terminology for all symptoms, signs, urodynamic investigations for male lower urinary tract (LUT) and pelvic floor (PF) dysfunction, the imaging associated with those investigations and the most common diagnoses.

It may have been possible in the past to combine all terminology for lower urinary tract function for men, women and children into one Report. The International Continence Society (ICS) has provided leadership in terminology for lower urinary tract dysfunction over decades employing combined or generic reports. The 1988[2] and 2002[3] Reports by the Committee on Standardization of Terminology are such examples. With the increasing specificity and complexity of the diagnoses in both sexes, combined reports, let alone attempting to cover "all patient groups from children to the elderly,"[3] may now be an anachronism. With evidence that the absence of specific female diagnoses as well as other female specific terminology, may not have been advantaged by a combined approach,[4] there occurred the development and 2010 publication of an International Urogynecological Association (IUGA)/ICS Joint Report on the Terminology for Female Pelvic Floor Dysfunction.[5] The 2002 Report[3] still provides the traditional core male terminology and some useful modifications, many of which are repeated in this document. The current report, with the large number of ***new*** and ***changed*** definitions, acknowledges that a male-specific update of terminology for LUT and PF symptoms and dysfunction is now timely.

It is hoped that some of the advantages noted in the female-specific document[5] might be seen here in this male document: (i) more comprehensive coverage of male-specific terminology; (ii) greater coherency and user-friendliness; (iii) greater specificity of male diagnoses; and (iv) more accurate communication for clinical and research purposes. It is also an aim in this document, to develop a general male terminology, forming a "backbone" or "core" terminology, to facilitate an update of the other subcategories of male-specific terminologies. There have been seven other (IUGA-ICS) female PF-related terminology documents,[6–12] all published, following the production of the initial joint IUGA/ICS document on female pelvic floor dysfunction.[5] The authors of that document[5] have kindly permitted the template of that Report to be used as the basis for the current Report. Four other male terminology reports have been initiated: (i) male anorectal dysfunction; (ii) surgical management of male LUT dysfunction; (iii) sexual health in men with LUT/PF dysfunction and (iv) conservative management of male LUT/PF dysfunction, to follow the publication of this "core" report.

This Terminology Report is inherently and appropriately a definitional document, collating the definitions of those terms, that is, words used to express a defined concept in a particular branch of study,[1] here core male terminology. Emphasis has been on comprehensively including those terms in current use in the relevant peer-reviewed literature. The aim is to assist clinical practice and research. Explanatory notes on definitions have been referred, where possible, to the "Footnotes section." Table 1 lists the number of definitions: (i) new; (ii) changed; (iii) total by section, compared with the previous male-inclusive Reports.[2,3]

As with its female terminology equivalent, qualities for a male-specific terminology report should be:

(1) User-friendly: It should be able to be understood by all clinical and research users.
(2) Clinically-based: Symptoms, signs, validated investigations and imaging should be presented for use in forming diagnoses. Sections 1-4 will address symptoms, signs, urodynamic investigations and current associated imaging modalities routinely used in the office, urodynamic laboratory, or imaging department to make those diagnoses. Readership is not assumed to be limited to medical specialists, accounting for a more extended "basic" physical examination (Section 2). Related radiological investigations, computerized tomography (CT) and magnetic resonance imaging (MRI) as well as a description of electromyography (EMG) has been included. This report limits terminology for neurogenic lower urinary tract dysfunction (LUTD) as this is covered by a separate ICS Report.[13]

TABLE 1 Total, new and changed definitions (compared with previous male-inclusive Reports[2,3])

Section	New definitions/descriptors	Changed definitions/descriptors	Total
Introduction & Symptoms	60	23	118
Signs	73	14	98
Investigations	23	25	106
Imaging	42	n/a	42
Diagnoses	14	9	26
Total	211 (54%)	71 (18%)	390

(3) Section 5 will address the most common diagnoses of male lower urinary tract and pelvic floor dysfunction. The terms[3] "urodynamic observation" and "condition" (non-medical) have not been used in this report. The scope of the report will exclude (i) diagnostic pathology (blood, urine, histology); (ii) more invasive investigations requiring an anesthetic; (ii) evidence-based treatments for each diagnosis.

(4) Origin: Where a term's existing definition (from one of multiple sources used) is deemed appropriate, that definition will be included and duly referenced. Many terms in male lower urinary tract and pelvic floor function, because of their long-term use, have now become generic, as apparent by their listing in medical dictionaries.

(5) Able to provide explanations: Where a specific explanation is deemed appropriate to explain a change from earlier definitions or to qualify the current definition, this will be included as an addendum to this paper (*Footnote [FN] 1,2,3 ….*). Wherever possible, evidence-based medical principles will be followed.

As in earlier ICS Reports,[2,3,5] when a reference is made to the whole anatomical organ, the *vesica urinaria*, the correct term is the bladder. When the smooth muscle structure known as the *m. detrusor vesicae* is being discussed, then the correct term is detrusor.

It is suggested that acknowledgement of these standards in written publications related to male lower urinary tract and pelvic floor symptoms and dysfunction, be indicated by a footnote to the section "Methods and Materials" or its equivalent, to read as follows: "Methods, definitions and units conform to the standards recommended by the International Continence Society, except where specifically noted."

SECTION 1: SYMPTOMS

Symptom: Any morbid phenomenon or departure from the normal in structure, function, or sensation, possibly indicative of a disease or health problem. Symptoms are either volunteered by, or elicited from the individual, or may be described by the individual's partner or caregiver[2,3,5]

Complaint: The description of the symptom.[1] ***(NEW)***

Main (Chief) Complaint: The symptom that a patient states as the main reason for seeking medical advice.[1] ***(NEW)*** The degree of "bother (worry, concern)" for other symptoms can be variable.[14] ***(NEW)***

Lower urinary tract symptom (LUTS): A symptom related to the lower urinary tract; it may originate from the bladder, prostate, urethra, and/or adjacent pelvic floor or pelvic organs, or at times be referred from similarly innervated anatomy, for example, lower ureter. ***(NEW)***

STORAGE SYMPTOMS

1.1 Storage Symptoms: Lower urinary tract symptoms occurring during the bladder storage phase. **(*NEW*)**

General Storage symptoms

1.1.1 Increased urinary frequency: Complaint that voiding occurs more frequently than deemed normal by the individual (or caregivers).[3,5] Time of day and number of voids are not specified. **(*NEW*)**

1.1.2 Increased daytime urinary frequency: Complaint that voiding occurs more frequently during waking hours than previously deemed normal by the individual (or caregivers).[3,5] $_{\text{FN1.1}}$ NB pollakiuria $_{\text{FN1.2}}$ **(*CHANGED*)**

1.1.3 Nocturia: The number of times urine is passed during the main sleep period. Having woken to pass urine for the first time, each urination must be followed by sleep or the intention to sleep. This should be quantified using a bladder diary.[18]

1.1.4 Polyuria (global symptom): Complaint that the urine excretion volume over 24 h is noticeably larger than the previous experience.$_{\text{FN1.4}}$ ***(NEW)***

1.1.4.1 Diurnal polyuria: Complaint that daytime urine excretion volume is noticeably larger than the previous experience. ***(NEW)***

1.1.4.1 Nocturnal polyuria (symptom)[18]: Complaint of passing large volumes of urine at night-time. ***(NEW)***

Sensory symptoms

1.1.5 Bladder filling (sensory) symptoms*:* Abnormal sensations experienced during bladder filling.[1] ***(NEW)***

1.1.5.1 Increased bladder filling sensation: Complaint that the sensation of bladder filling occurs earlier or is more intense or persistent to that previously experienced.[3,5] ***(CHANGED)*** N.B. This differs from urgency by the fact that micturition can be postponed despite the desire to void.

1.1.5.2 Urgency: Complaint of a sudden, compelling desire to pass urine which is difficult to defer.[3,5] $_{\text{FN1.5, FN1.6}}$

1.1.5.3 Reduced bladder filling sensation: Complaint that the sensation of bladder filling is less intense or occurs later in filling than previously experienced. ***(CHANGED)***

1.1.5.4 Absent bladder filling sensation*:* Complaint of both the absence of the sensation of bladder fullness and a definite desire to void[3]

1.1.5.5 Non-specific (atypical) bladder filling sensation (bladder dysesthesia)*:* Complaint of abnormal bladder filling sensation such as the perception of vague abdominal bloating, vegetative symptoms (nausea, vomiting, faintness), or spasticity. (***CHANGED***) $_{\text{F1.7}}$ It differs from normal bladder filling sensation or pain, pressure or discomfort of the bladder.

Incontinence symptoms

1.1.6 Urinary incontinence symptoms[16]: Involuntary loss of urine experienced during the bladder storage phase $_{\text{FN1.8, FN1.9}}$.***(NEW)***

1.1.6.1 Urinary incontinence (symptom): Complaint of involuntary loss of urine.[3,5] $_{\text{FN 1.9}}$

1.1.6.2 Urgency urinary incontinence (UUI)[3,5]: Complaint of involuntary loss of urine associated with urgency.

1.1.6.3 Stress urinary incontinence (SUI): Complaint of involuntary loss of urine on effort or physical exertion including sporting activities, or on sneezing or coughing.[3,5] N.B. "*activity (effort)-related incontinence*" might be preferred in some languages to avoid confusion with psychological stress. $_{\text{FN1.10}}$

1.1.6.4 Mixed urinary incontinence (MUI): Complaints of both stress and urgency urinary incontinence, that is, involuntary loss of urine associated with urgency as well as with effort or physical exertion including sporting activities or on sneezing or coughing (stress).[3,5]

1.1.6.5 Enuresis: Complaint of intermittent (non-continuous) incontinence that occurs during periods of sleep.[18] ***(CHANGED)***

1.1.6.6 Continuous urinary incontinence: Complaint of continuous involuntary loss of urine.[3,5] ***(CHANGED)***

1.1.6.7 Insensible urinary incontinence: Complaint of urinary incontinence where the individual is aware of urine leakage but unaware of how or when it occurred.[5] ***(CHANGED)***

1.1.6.8 Postural urinary incontinence: Complaint of urinary incontinence during change of posture or position, for example, from supine or seated to standing.$_{\text{FN1.12}}$ ***(NEW)***

1.1.6.9 Disability associated incontinence: Complaint of urinary incontinence in the presence of a functional inability to reach a toilet/urinal in time because of a physical (eg, orthopedic, neurological) and/or mental impairment. ***(NEW)***

1.1.6.10 Overflow incontinence: Complaint of urinary incontinence in the symptomatic presence of an excessively (over-) full bladder (no cause identified). ***(NEW)***

1.1.6.11 Sexual arousal incontinence[19]: Complaint of involuntary loss of urine during sexual arousal, foreplay and/or masturbation. ***(NEW)***

1.1.6.12 Climacturia[19]: Complaint of involuntary loss of urine at the time of orgasm. ***(NEW)***

Storage symptom syndrome

1.1.7 Overactive bladder (OAB, urgency) syndrome*:* Urinary urgency, usually accompanied by increased daytime frequency and/or nocturia, with urinary incontinence (OAB-wet) or without (OAB-dry), in the absence of urinary tract infection or other detectable disease.[3,5] ***(CHANGED)***

VOIDING SYMPTOMS

1.2 Voiding symptoms: Lower urinary tract symptoms during the voiding phase (experienced during micturition). ***(NEW)***

1.2.1. Hesitancy: Complaint of a delay in initiating voiding (when the individual is ready to pass urine). ***(CHANGED)***

1.2.2. Paruresis ("bashful" or "shy bladder"): Complaint of the inability to initiate voiding in public (i.e. voiding in the presence of other persons) despite there being no difficulty in private.[20] $_{\text{FN1.13}}$ ***(NEW)***

1.2.3 Episodic inability to void: Complaint of occasional inability to initiate voiding despite relaxation and/or an intensive effort (by abdominal straining, Valsalva maneuver or suprapubic pressure). ***(NEW)***

1.2.4 Straining to void: Complaint of the need to make an intensive effort to either initiate, maintain or improve voiding or the urinary stream.[3,5] ***(CHANGED)***

1.2.5 Slow (urinary) stream: Complaint of a urinary stream perceived as overall slower than previous performance or in comparison with others.[3,5]

1.2.6 Intermittency: Complaint of urine flow that stops and starts on one or more occasions during one voiding episode.[3,5]

1.2.7 Terminal dribbling: Complaint that during the final part of voiding there is noticeable slowing of the flow to drops or a trickling stream. ***(CHANGED)***

1.2.8 Spraying (splitting) of urinary stream: Complaint that the urine passage is a spray or split rather than a single directional stream.[3,5] ***(CHANGED)***

1.2.9 Position-dependent voiding: Complaint of having to adopt specific positions to be able to void spontaneously or to improve bladder emptying, for example, needing to void in a seated position. ***(NEW)***

1.2.10 Dysuria: Complaint of pain, burning, other discomfort, or difficulty during voiding. Discomfort may be intrinsic to the lower urinary tract (eg, bladder or urethra), external, or referred from other adjacent similarly innervated structures, for example, lower ureter. $_{\text{FN1.14}}$ **(*CHANGED*)**

1.2.11 Stranguria: Complaint of voiding which is slow, difficult and spasmodic (at times "drop by drop"), usually associated with pain. ***(NEW)***$_{\text{FN1.15}}$

1.2.12 Hematuria: Complaint of passage of visible blood mixed with urine. This may be initial (at the beginning), terminal (at the end) or total (throughout bladder emptying). ***(NEW)***

1.2.13 Pneumaturia[1]: Complaint of the passage of gas (or air) from the urethra during or after voiding. ***(NEW)***

1.2.14 Fecaluria[1]: Complaint of passage of feces (per urethram) in the urine. ***(NEW)***

1.2.15 Chyluria (albiduria)[1]: Complaint of passage of chyle (pale or white, milky cloudy) in the urine.[1] ***(NEW)***

1.2.16 Urinary retention: Complaint of the inability to empty the bladder completely.[1] **(*NEW*)**

1.2.16.1 Acute urinary retention (AUR): Complaint of a rapid onset, usually painful suprapubic sensation (from a full bladder) due to inability to void (non-episodic), despite persistent intensive effort.$_{\text{FN1.16}}$ ***(NEW)***

1.2.16.2 Chronic urinary retention (CUR): Complaint of chronic or repeated inability to empty the bladder, despite the ability to pass some urine. This may result in the frequent passage of small amounts of urine or urinary incontinence and a distended bladder $_{\text{FN1.17}}$ ***(NEW)***

POST-VOIDING SYMPTOMS

1.3 Postvoiding Symptom: Lower urinary tract symptom experienced after voiding has ceased. ***(NEW)***

1.3.1 Feeling of incomplete (bladder) emptying: Complaint that the bladder does not feel empty after voiding has ceased.[3,5] ***(CHANGED)***

1.3.2 Need to immediately re-void ("Encore" or "Double" voiding): Complaint that further voiding is necessary soon after passing urine (cessation of flow).[3,5] ***(CHANGED)***

1.3.3 Post-voiding incontinence: Complaint of a further involuntary passage (incontinence) of urine or dribbling following the completion of voiding[3,5] $_{\text{FN1.18}}$. ***(NEW)***

1.3.4 Post-micturition urgency: Complaint of persistent urgency post-voiding. ***(NEW)***

Voiding symptom syndrome (proposal for further research) – Underactive bladder syndrome: $_{\text{FN1.19}}$

1.4 Lower Urinary Tract Pain and/or Other Pelvic Pain

1.4.1 Pain: A variably unpleasant sensation.[1] It may be described as pressure or discomfort by the patient. Pain should be characterized by site, type, frequency, duration, precipitating, and relieving factors.$_{\text{FN1.20; FN 1.21}}$ ***(CHANGED)***

1.4.2 Bladder pain: Complaint of suprapubic or retropubic pain, pressure or discomfort related to the bladder, and usually associated with bladder filling. It may persist or be relieved after voiding.[3,5] ***(CHANGED)***

1.4.3 Urethral pain: Complaint of pain, pressure or discomfort felt in the urethra[3,5] before, during and/or after voiding and the man indicates the urethra as the site. **(*CHANGED*)**

1.4.4 Scrotal pain: Complaint of pain, pressure or discomfort felt in and around the scrotum.[3] It may be localized to the testis, epididymis, cord structures, or scrotal skin.

1.4.5 Perineal pain: Complaint of pain, pressure, or discomfort felt on the surface or in the depth of the tissue between the scrotum and the anus.[3]

1.4.6 Pelvic pain: Complaint of pain, pressure, or discomfort related to the pelvis but not clearly related to the bladder, urethra, scrotum, or perineum.[3]

1.4.7 Ejaculatory pain: Complaint of pain, pressure, or discomfort felt in the perineum, suprapubic region and/or penis during ejaculation, but may continue for a time afterwards. ***(NEW)***$_{\text{FN 1.22}}$

1.4.8 Anorectal pain symptoms: Complaint of pain, pressure or discomfort particularly during defecation or straining to defecate but can occur at any time. ***(NEW)***

1.4.8.1 Pain during straining /defecation: Pain during defecation or straining to defecate.

1.4.8.2 Inflammatory anorectal pain: Pain characterized by burning or stinging (inflammation, radiation, sepsis). ***(NEW)***

1.4.8.3 Non-inflammatory anorectal pain: Blunted anorectal pain (proctalgia fugax, Levator ani syndrome, pudendal neuralgia). ***(NEW)***

1.4.9 Coccygeal pain (coccydynia): Complaint of pain, pressure, or discomfort in the coccygeal region. ***(NEW)***

1.4.10 Pudendal pain (neuralgia): Complaint of pain, pressure, or discomfort in one or more of the areas innervated by the pudendal nerve (may be caused by inflammation or entrapment of the pudendal nerve and involving its dermatome). **(*CHANGED*)**

1.4.11 Chronic pelvic pain syndromes: See ICS standard for terminology in chronic pelvic pain syndromes.[23] $_{\text{FN1.21}}$

1.5 Urinary tract infection (UTI)

1.5.1 Symptoms of acute urinary tract infection: Symptoms such as increased bladder sensation, urgency, frequency, dysuria/stranguria, pain in the lower urinary tract with or without urgency urinary incontinence might suggest lower urinary tract infection. Confirmation of a UTI requires evidence of significant microorganisms and pyuria. $_{\text{(FN1.23, FN 1.24)}}$ ***(CHANGED)***

1.5.2 Recurrent urinary tract infections (UTIs): A history of at least two symptomatic and medically diagnosed UTI in the previous 12 months.$_{\text{FN1.25}}$ The previous UTI(s) should have resolved prior to a further UTI being diagnosed. (***CHANGED***).

1.5.3 Urethral discharge: Of mucus, pus, or blood, from the urethral meatus. (***NEW***)

1.6 Symptoms of sexual dysfunction

1.6 Symptoms of sexual dysfunction: Abnormal sensation and/or function experienced by a man during sexual activity. ***(NEW)***

1.6.1 Altered Libido: Change in interest in sexual activity. ***(NEW)***

1.6.1.1 Decreased libido: Complaint of decreased interest in sexual activity in comparison to previous experience. ***(NEW)***

1.6.1.2 Increased libido: Complaint of increased interest in sexual activity in comparison to previous experience. ***(NEW)***

1.6.2 Erectile dysfunction[25]: Complaint of inability to achieve and sustain an erection firm enough for satisfactory sexual performance. ***(NEW)***

1.6.3 Ejaculatory dysfunction: Complaint of alteration of the emission of seminal fluids during ejaculation. ***(NEW)***

1.6.3.1 Anejaculation: Complaint of absence of seminal fluid emission. May be associated with the absence of the sensation of orgasm or anorgasmia. ***(NEW)***

1.6.3.2 Delayed ejaculation: Complaint of an increase in the time taken for ejaculation to occur. ***(NEW)***

1.6.3.3 Premature ejaculation: Complaint of a persistent or recurrent pattern of too rapid achievement of ejaculation during partnered sexual activity,[1] that is, before the individual wishes it. $_{\text{FN 1.26}}$ ***(NEW)***

1.6.3.4 Decreased (low) semen volume**: Complaint of smaller amount of seminal fluid than normal or previously experienced $_{\text{FN1.27}}$. **(*NEW*)**

1.6.3.5 Increased (high) semen volume: Complaint of higher amount of seminal fluid than normal or previously experienced. (***NEW***)$_{\text{FN1.27}}$

1.6.4 Hematospermia: Complaint of the appearance of visible blood in the seminal fluid. Color of the seminal fluid may be red or brown. ***(NEW)***

1.6.5 Penile pain with intercourse (male dyspareunia): Complaint of any penile discomfort occurring during intercourse. May be caused by penile disease, vaginal anatomy (eg, vaginal tightening, scarring, or exposed mesh) and/or may relate to various positions with intercourse. $_{\text{FN1.28}}$ ***(NEW)***

1.6.6 Obstructed intercourse: Complaint that vaginal intercourse is not possible due to perceived obstruction. Whilst this may be a partner issue, it can occur in cases of penile curvature (Peyronie's disease) or penile carcinoma. ***(NEW)***

1.7 Symptoms of anorectal dysfunction[5,10,27]: FN1.29

1.7.1 Anorectal incontinence (symptoms): Complaint of involuntary loss of flatus or feces.[5,10] Can be further subdivided into:

1.7.1.1 Flatal incontinence: Complaint of involuntary loss of flatus (gas).[5,10]

1.7.1.2 Fecal incontinence: Complaint of involuntary loss of feces.[5,10]
- when feces is solid and/or
- when feces is liquid

1.7.1.3 Fecal (rectal) urgency: Complaint of a sudden, compelling desire to defecate that is difficult to defer.[5,10]

1.7.1.4 Fecal (flatal) urgency incontinence: Complaint of involuntary loss of feces (flatus) associated with fecal urgency.[5,10,27]

1.7.1.5 Passive (insensible) fecal incontinence: Complaint of involuntary soiling of liquid or solid stool without sensation or warning. (***NEW***)

1.7.1.6 Overflow fecal incontinence: Complaint of involuntary loss of stool due to an overfull rectum or fecal impaction. ***(NEW)***

1.7.1.7 Coital fecal incontinence: Complaint of involuntary loss of stool occurring with intercourse.[5,10]

1.7.1.8 Stress fecal incontinence (SUI): Complaint of involuntary loss of feces on effort or physical exertion including sporting activities, or on sneezing or coughing. ***(NEW)***

1.7.2 Anorectal sensory symptoms

1.7.2.1 Diminished rectal sensation (rectal hyposensitivity): Complaint of diminished or absent sensation of filling in the rectum. *(CHANGED)*

1.7.2.2 Increased rectal sensation (rectal hypersensitivity): Complaint of a desire to defecate (during rectal filling) that occurs earlier or more persistent to that previously experienced. ***(NEW)***

NB: for 1.7.2.1 and 1.7.2.2, can be to (i) first sensation; (ii) urge sensation; (iii) maximum tolerated volume.

1.7.2.3 Tenesmus: Complaint of an urgent desire to evacuate the bowel, accompanied by involuntary straining and the passage of little fecal matter.[1]

1.7.3 Defecatory or post-defecatory symptoms: Symptoms experienced during or following the act of defecation. ***(NEW)***

1.7.3.1 Constipation: Complaint that bowel movements are infrequent and/or incomplete and/or there is a need for frequent straining or manual assistance to defecate. (Rome IV criteria[28]) FN1.30.

1.7.3.1.1 Slow transit: infrequent bowel motions due to delay in transit of bowel contents to reach rectum.

1.7.3.1.2 Obstructed defecation: Complaint of difficulty in evacuation due to a mechanical obstruction.

1.7.3.2 Feeling of incomplete bowel evacuation: Complaint that the rectum does not feel empty after defecation. May be accompanied by a desire to defecate again.[5,10]

1.7.3.3 Straining to defecate: Complaint of the need to make an intensive effort (by abdominal straining or Valsalva) or to use abdominal massage to either initiate, maintain, or improve defecation.[5,10]

1.7.3.4. Manual defecatory assistance

1.7.3.4.1 Internal: Anorectal Digitation: Complaint of the need to use of fingers in the rectum to manually assist in evacuation of stool contents by scooping, stretching and/or stimulation.[5] ***(NEW)***

1.7.3.4.2 External: Perineal pressure or buttock separation: Complaint of the need to press on the perineum or separate the buttocks to assist defecation. (NEW)

1.7.3.5 Post defecatory soiling: Complaint of soiling occurring after defecation. ***(NEW)***

1.7.3.6 Rectal bleeding/mucus: Complaint of the loss of blood or mucus per rectum.

1.7.4 Anorectal prolapse: Complaint of external protrusion (bulge) of the anus or rectum (differentiation on subsequent examination between rectal mucosal prolapse and full thickness rectal wall prolapse which includes muscle and serosal layers). ***(CHANGED)***

1.8 Other Relevant History

Current medications, previous urological operations, radiotherapy, and catheterization should be noted.

Footnotes for Section 1

1.1: Milsom et al.[15] first reported that frequency caused by an overactive bladder was arbitrarily defined as more than eight micturitions per 24 h, given that the normal voiding frequency in healthy individuals is typically under six micturitions per 24 h. It was higher than previously reported for healthy women using a frequency/volume chart (median 5.5 micturitions per 24 h).[15–17]

1.2: Pollakiuria: Complaint of abnormally (extraordinary[1]) frequent micturition (rarely used definition).

1.3: It is common to void during the night when sleep is disturbed for other reasons—eg, insomnia—this does not constitute nocturia.

1.4: Polyuria is more fully defined in the "Signs" section.

1.5: "Urgency" replaces "urge" as the "accepted" terminology for the abnormal rather than the normal phenomenon.

1.6: The use of the word "sudden," defined as "without warning or abrupt," used in earlier definitions[2,3,5] has been subject to much debate. Its inclusion has been continued.

1.7: This symptom generally occurs where there is some form of neurological disease.

1.8: "Continence" is defined as absence of involuntary leakage of bowel and bladder contents (i.e. normal voluntary control of bowel and bladder function).

1.9: In each specific circumstance, urinary incontinence should be further described by specifying relevant factors such as type, severity, precipitating factors, social impact, effect on hygiene, and quality of life, the measures used to contain the leakage, and whether or not the individual seeks or desires help because of urinary incontinence.

1.10: This change is to accommodate for ambiguity in some languages between stress and anxiety. This symptom would most commonly occur in men who have undergone (radical) prostatectomy. Men who had radical prostatectomy may experience activity-related incontinence and/or during sex.[19]

1.11: Small amounts of urine may be leaked without warning.

1.12: Men with post-prostatectomy incontinence do report this. It also happens in men after artificial sphincter placement. When they get up, they leak. Can be due to stress and without urge or other associated symptoms in the standing or upright position.

1.13: The term "pareuresis" is not in common usage, although the symptom is well-recognised.[20] Paruresis is defined as the fear of being able to urinate in situations where other persons are present. Diagnostic and statistical manual of mental disorders. Arlington, VA: American Psychiatric Association; 2013.

1.14: Dysuria is a type of urethral pain but could be urethral in origin or referred there from a pathological process in bladder, lower ureter or prostate.

1.15: The symptom of "stranguria" is poorly understood, overlapping at times with urethral pain, dysuria, and pelvic pain.

1.16: The bladder is distended, palpable, and possibly tender. A significantly increased residual is present.

1.17: Non-neurogenic chronic urinary retention (CUR) in men (AUA consensus[21] supported by the current authors) can be defined as an elevated post-void residual of greater than 300 mL that has persisted for at least 6 months and is documented on two or more separate occasions. Evidence is not strong. CUR can be caused by different pathologies that create detrusor underactivity and/or result in chronic bladder outlet obstruction.[21]

1.18: May occur after clothing has been adjusted, due to some "pooling" of urine in the urethra if underwear, or clothing has caused some restriction during voiding or a urethral stricture or diverticulum.

1.19: Complaints of a slow urinary stream, hesitancy and straining to void, with or without sense of incomplete bladder emptying and dribbling, sometimes with storage symptoms: symptom grouping proposed to be suggestive of detrusor underactivity[22] (DU). Diagnosis of actual detrusor underactivity depends on urodynamic findings as discussed in Section 5 on Diagnoses.

1.20: It is often difficult to localize pain precisely, so descriptions as to location of the pain may be imprecise. For example, the term "bladder pain" does not necessarily indicate that the bladder is the cause. Pain thought to be arising from the bladder, or felt in the urethra, scrotum or perineum might be referred from the lower ureter, or bladder base or other pelvic organs.

1.21. The definitions of pelvic pain and especially chronic pelvic pain had been debated in several societies with a view to simplification and restructuring of the classification. The ICS has now published a report from chronic pelvic pain syndromes.[23]

1.22. Painful ejaculation (previously termed "odynorgasmia"), is a poorly characterized syndrome. It may be associated with urethritis, BPH, acute or chronic prostatitis, CPPS, seminal vesiculitis, seminal vesicular calculi or ejaculatory duct obstruction. Often, no obvious etiologic factor can be found.

1.23: Commonly suggested criteria for: (i) Bacteriuria are>100 000 CFU/mL on voided specimen or >1000 CFU/mL on catheterized specimen; (ii) Pyuria are >10 WBC/mm^3 in uncentrifuged urine. The presence of nitrites in the urine is supportive of a UTI involving a common organism (*E. Coli*, Klebsiella).

1.24: Those symptomatic patients with fewer colony counts may still harbor organisms detectable by mRNA analyses not widely available at present.[24] Testing for urinary microbiome is being explored but it is not widely available.

1.25: Recurrent urinary tract infections (UTIs) has not been consistently defined. They are far less common in men than women but perhaps more significant. There is the difficulty of balancing the practical clinical definition and the scientific one. Records of diagnostic tests are often inaccessible over the medium to longer term. With a bias towards the former category, a definition might be the presence at least two symptomatic and medically diagnosed UTIs in 12 months. "Recur" strictly means to "occur again" or "be repeated."

1.26: This symptom must have been present for at least 6 months and must be experienced on almost all or all (approximately 75-100%) occasions of sexual activity. It causes clinically significant distress in the individual. It has been called early ejaculation, rapid ejaculation, rapid climax or premature climax. There is no uniform cut-off defining "premature," but a consensus of experts at the International Society for Sexual Medicine endorsed a definition of around 1 min after penetration. The International Classification of Diseases (ICD-10) applies a cut-off of 15 s from the beginning of sexual intercourse.

1.27: Mean semen volume is 3.9 mL (5^{th} centile 1.5 mL; 95^{th} centile 6.8 mL). Low semen volume is under 1.5 mL; high semen volume is over 6.8 mL.[25,26]

1.28: Dyspareunia ("hispareunia"), the symptom most applicable to male discomfort on sexual intercourse, will depend on many factors including a woman's introital relaxation and/or anatomical factors.

1.29. Symptoms of defecatory dysfunction are not uncommon in men, particularly those who have undergone anal sphincterotomies for fissure-in-ano.

1.30. Rome IV Criteria for 1.8.3.1 *Constipation*[28]: Complaint that bowel movements are (i) infrequent (<3/wk); (ii) need to strain; (iii) lumpy or hard stool bloating; (iv) sensation of incomplete evacuation; (v) sensation of anorectal obstruction or blockage abdominal pain, (vi) need for manual assistance, in more than one quarter of all defecation.

SECTION 2: SIGNS

Sign: Any abnormality indicative of disease or a health problem, discoverable on examination of the patient; an objective indication of disease or a health problem.[1] ***(CHANGED)***

General principles of examination for male with symptoms of LUT/PF dysfunction[29]: A comprehensive physical examination is done to seek potential influences on symptoms.$_{FN2.1}$ It should include abdominal examination, focussing on the suprapubic area to detect an enlarged bladder, or other abdominal mass, and digital examination of the rectum (prostate) as well as examination of the external genitalia, the perineum and lower limbs. The hernia orifices should also be evaluated. Penile lesions including meatal stenosis, phimosis, and penile cancer must be excluded.[29–31] If a neurological diagnosis is suspected, then a focused neurological examination with evaluation of perianal crude and pinprick sensations need to be tested. Also, the anal muscle tone can be assessed with finger in the rectum and asking the patient to squeeze. ***(NEW)***

2.1 General (visual) observations

- **2.1.1 Mobility**: generalized muscle strength and ability to ambulate independently or with assistance. ***(NEW)***
- **2.1.2 Skin*:*** jaundice or pallor or skin irritation due to urinary loss. ***(NEW)***
- **2.1.3 Nutritional Status*:*** cachexia (possible underlying malignancy); obesity (possible endocrine abnormality[29] including metabolic syndrome). ***(NEW)***
- **2.1.4 Edema of genitalia and lower extremities**: Possible cardiac decompensation, renal failure, nephrotic syndrome, or pelvic and/or retroperitoneal lymphatic obstruction.[29–31] ***(NEW)***

2.2 Abdominal examination[3,5]: Among numerous possible abdominal signs are:

- **2.2.1 Bladder fullness/retention:** The bladder may be felt by abdominal palpation or detected by suprapubic percussion. $_{FN2.2}$ ***(CHANGED)***
- **2.2.2 Other abdominal masses:** or distension (eg, ascites). *(NEW)*
- **2.2.3 Scars:** Indicating previous relevant surgery, traumas, or evidence of previous radiotherapy. ***(NEW)***
- **2.2.4 Renal Area*:*** Examination for tenderness, masses. ***(NEW)***

2.3 Lower Urinary Tract/Genital Examinations/Signs

2.3.1 Genital skin:

- **2.3.1.1** Excoriation, redness, irritation secondary to urinary incontinence and the effect of pads or diapers. ***(NEW)***
- **2.3.1.2** Mycotic infections (balanoposthitis, intertrigo, or scrotal): Moist, red pruritic skin usually in men with urinary or fecal incontinence, immune suppression or poorly controlled diabetes mellitus.[32] ***(NEW)***
- **2.3.1.3** Skin pigmentation: balanitis xerotica obliterans (BXO – syn. *lichen sclerosus*) and vitiligo may cause depigmentation (penile skin, scrotum, glans). ***(NEW)***
- **2.3.1.4** Cutaneous manifestations of sexually transmitted diseases: vesicles, ulcers. ***(NEW)***

2.3.2 Penile examination:

2.3.2.1 Foreskin abnormalities:

2.3.2.1.1 Tumor or infection (balanoposthitis, ie, inflammation of the glans penis and overlying foreskin[1]). ***(NEW)***

2.3.2.1.2 Phimosis[33]: Partial or complete inability to retract the prepuce due to adhesion between the glans and the prepuce or a preputial ring. $_{\text{FN2.3}}$ ***(NEW)***

2.3.2.1.3 Paraphimosis[33]: Entrapment of the prepuce behind the glans.$_{\text{FN2.3}}$ ***(NEW)***

2.3.2.2 Position of the urethral meatus[31]:

2.3.2.2.1 Hypospadias: Refers to the urethral meatus sited on ***ventral surface*** of the penis, either congenital or acquired, proximal to its normal position on the tip of the glans. External urethral meatus may be on the glans penis (*glandular hypospadias*), sulcus (*coronal hypospadias*), shaft (*penile hypospadias*), scrotum (*scrotal hypospadias*), or perineum (*perineal hypospadias*). ***(NEW)***

2.3.2.2.2 Epispadias: Refers to the urethral meatus sited on ***dorsal surface*** of the penis, either congenital or acquired, proximal to its normal position on the tip of the glans. ***(NEW)***

2.3.2.2.3 Neoplastic or inflammatory lesions within the fossa navicularis.[34] ***(NEW)***

2.3.2.2.4 Post-hypospadias/epispadias repair: including post-urethroplasty urethral fibrosis: palpated near the meatus or in the penile shaft. **(*NEW*)**

2.3.2.2.5 Postoperative fistula: Urine is visible at or near the incision lines. ***(NEW)***

2.3.2.3 Urethral examination*:*

2.3.2.3.1 Palpation: along the ventral aspect of the penis and inferiorly into the perineum to detect fibrosis, lumps or tenderness along the shaft. ***(NEW)***

2.3.2.3.2 Tenderness: suggestive of urethral or periurethral inflammation, often secondary to a urethral stricture[34] or sexually transmitted disease. ***(NEW)***

2.3.2.3.3 Meatal stenosis: narrowing changes of the distal urethra; post-infection, post-surgery. ***(NEW)***

2.3.2.4 Examination of the glans and shaft

2.3.2.4.1 Penile plaque: palpation of node or plaque in the tunica usually on the dorsal aspect (perhaps related to Peyronie's disease). ***(NEW)***

2.3.2.4.2 Lichen sclerosus: tight foreskin, cracking, and bleeding.

2.3.2.5 General examination: redness, ulcers, warts, ***(NEW)***

2.3.3 Scrotal examination: *(NEW)*

2.3.3.1 Normal: The scrotum is a loose sac containing the testes and spermatic cord structures. The epididymis is palpable applied to the posterior surface of the testis as a ridge although occasionally it is sited on the anterior surface. $_{\text{FN 2.4}}$ ***(NEW)***

2.3.3.2 Inflammation: The epididymis may be swollen and tender, and if severe, the inflammatory process may involve the whole scrotal content (i.e. testis and epididymis [epididymo-orchitis]) and the scrotal skin as well. $_{\text{FN2.5}}$ ***(NEW)***

2.3.3.3 Cystic dilatations of the epididymis: (epididymal cysts or spermatocele) and hydroceles (fluid collections between the visceral tunica albuginea and parietal layer of the testicular peritoneum)—usually benign. The examination of these structures would be generally non-tender and without pain (as opposed to **2.3.3.2**). $_{\text{FN2.6}}$ ***(NEW)***

2.3.3.4 Inguinal bulge: Examination and differentiation of hernia from hydrocele or cyst of spermatic cord or groin lymph nodes. ***(NEW)*** (use of transillumination may assist though ultrasound is generally diagnostic) $_{\text{FN2.7}}$

2.3.4 Perineal examination: this is generally performed with the patient in the lateral supine or in the lithotomy position. ***(NEW)***

2.3.4.1 Perianal dermatitis: Skin infection at the perineum around the anus, usually associated with fecal incontinence or diarrhoea. ***(NEW)***

2.3.4.2 Fissures: A break or tear in the skin of the perineum, anal sphincter or distal rectum usually associated with anal pain. ***(NEW)***

2.3.5 Rectal and prostate examination: Digital rectal examination (DRE) is recommended[35–37] as part of the physical examination. Generally done with the patient standing and bent over the examining table, or with the patient in the left lateral knees bent position, or in the lithotomy position. DRE is usually pain-free. ***(NEW)***

2.3.5.1 Anal examination: This can detect the following findings in the anal sphincter or distal rectum: ***(NEW)***

2.3.5.1.1 Benign diseases: hemorrhoids, fissure, anal sphincter injury, levator discomfort, or pain. ***(NEW)***

2.3.5.1.2 Possible malignant diseases: anal, distal rectal, and prostate carcinoma. ***(NEW)***

2.3.5.1.3 Anal tone: increased or decreased anal sphincter tone might suggest similar changes in the urinary sphincter and may indicate neurologic disease. ***(NEW)***

2.3.5.1.4 Anal stricture: a circumscribed narrowing or stenosis of the anal canal. ***(NEW)***

2.3.5.2 Prostate gland characteristics: size, symmetry, firmness, nodules, and its relation to the pelvic sidewall and rectum can be assessed.[35–37] The gland is about the size of a walnut and has a consistency similar to that of the contracted thenar eminence of the thumb $_{\text{FN2.8}}$. ***(NEW)***

2.3.5.3 Nodularity and/or firmness – May indicate possible abnormality requiring further investigation.[37] ***(NEW)***

2.3.5.4 Prostate tenderness: prostate palpation, as part of a DRE, is usually pain-free. Pain with prostatic palpation is variable though if present, it may be helpful in differentiating prostate/pelvic pain syndromes.[34] ***(NEW)***

2.3.5.5 Rectal examination (circumferential): this might lead to the detection of nonurological diseases such as rectal carcinoma, fistula and fecal impaction.$_{\text{FN2.9}}$ ***(NEW)***

2.4 Focused neurological exam[3,5]

2.4.1 Overall neurological status: abnormalities of speech, gait as well as upper and lower extremity dexterity should be noted as they may indicate a neurological cause for the urological symptoms. Neuropathy may impact also on management options.[38] $_{\text{FN2.10}}$ ***(CHANGED)***

2.4.2 Level of neurologic abnormality: can occasionally be localized by the pattern of sensory or motor deficit noted during physical examination using a dermatome map.[30] ***(NEW)***

2.4.3 Penile, scrotal, or perianal sensory deficits: may indicate damage or injury to sacral roots or nerves. Reflex testing in the genital area may also be performed. The most important of these is the BSR.[39] ***(NEW)***

2.4.4 Bulbospongiosus reflex (BSR)[39] a reflex contraction of the striated muscle of the pelvic floor (anal sphincter) and the bulbo-spongiosus muscle that occurs in response to various stimuli in the perineum or genitalia. $_{\text{FN2.11}}$ ***(NEW)***

2.4.5. Cremasteric reflex: contraction of the ipsilateral cremaster muscle, drawing the testis upwards, when the upper inner aspect of the thigh is stroked longitudinally. ***(NEW)***

2.5 Urinary Incontinence Signs[3,5,40,41]: All examinations for the evaluation of urinary incontinence are best performed with the individual's bladder comfortably full.

2.5.1 Urinary incontinence[3,5]: observation of involuntary loss of urine on examination.

2.5.2 Stress urinary incontinence (clinical stress leakage)[3,5]: observation of involuntary leakage from the urethral orifice synchronous with effort or physical exertion, or on sneezing or coughing.

2.5.3 Urgency urinary incontinence[3,5]: observation of involuntary leakage from the urethral orifice associated with the individual reporting a sudden, compelling desire to void. ***(CHANGED)***

2.5.4 Extra-urethral incontinence[3,5]: observation of urine leakage through channels other than the urethral meatus, for example, fistula. $_{\text{FN2.12}}$

2.6 Pelvic floor muscle (PFM) function.[3,5,42,43] The following signs of PFM function may be assessed via the perineum (visual or tactile examination) or per rectum (digital palpation) examination. Digital rectal examination (DRE) may be less useful in male urinary dysfunctions where the urethral sphincter, inaccessible to DRE, has a more important role.[44] ***(NEW)***

2.6.1 Perineal examination[3,5,42,43]—when the patient is asked to cough or bear down, the perineum should only show limited downward movement; ventral movement may occur because of the guarding actions of the pelvic floor muscles. **(*CHANGED*)**

2.6.1.1 Perineal elevation[43,44]: This is the inward (ventro-cephalad) movement of the perineum and anus. FN2.13 Look for testicular lift and penile retraction. These need to be checked against movement of the scrotum and the whole penis. Correct movement occurs with the PFM only: the shaft of the penis draws in and the testes lift in a cephalad direction. These movements may be better visualized in standing than supine position.[45–47] ***(NEW)***

2.6.1.2 Perineal descent[43]: This is the outward (dorso-caudal) movement of the perineum and anus.

2.6.2 Examinations[43]

2.6.2.1 PFM state at rest; aspects to assess. FN2.13

2.6.2.1.1 Myalgia: provoked by palpation. Levator muscle pain/tenderness may be elicited by palpation of these muscles via rectal examination.[43] FN 2.14 ***(NEW)***

- **Tender point*:*** Tenderness to palpation at a specific soft tissue body site. ***(NEW)***

2.6.2.1.2 Tone: state of the muscle, usually defined by its resting tension, clinically determined by resistance to passive movement. Muscle tone has two components, the contractile component and the viscoelastic component. Muscle tone may be altered in the presence or absence of pain. ***(CHANGED)***

2.6.2.1.3 Increased PFM tone (non-neurogenic hypertonicity): increased tone in a patient without an intercurrent neurological diagnosis. ***(CHANGED)***

2.6.2.1.4 Decreased PFM tone (non-neurogenic hypotonicity): decreased tone in a patient without an intercurrent neurological diagnosis. ***(CHANGED)***

2.6.2.1.5 Symmetry: if examining in the left lateral, there will be a gravity effect and the dependent side will have a different feel to the upper side and appear as asymmetrical. This may affect PFM tone. Not so common in men. ***(NEW)***

2.6.2.1.6 PFM injury: for example, palpable anal sphincter gap though overall not common unlike women. ***(NEW)***

2.6.2.2 PFM contractile function: Aspects to assess

2.6.2.2.1 Voluntary contractility[43]: the individual is able to contract the PFM on demand. A contraction is felt as a tightening, lifting, and squeezing action under/around the finger. ***(NEW)***

2.6.2.2.2 Strength[43]: Force-generating capacity of a muscle. It is generally expressed as maximum voluntary contraction. ***(NEW)***

2.6.2.2.3 Endurance[43]: the ability to sustain near maximal or maximal force, assessed by the time a patient is able to sustain a maximal static or isometric contraction. ***(NEW)***

2.6.2.2.4 Repeatability[43]: the ability to repeatedly develop near maximal or maximal force, determined by assessing the maximum number of repetitions the patient can perform before detectable decline in force. Record number of contractions in a row. ***(NEW)***

2.6.2.2.5 Co-contraction: contraction or activation of two or more muscles at the same time. Identify which muscles are co-contracting and whether the co-contraction is synergistic. ***(NEW)***

2.6.2.2.6 Relaxation ability: return of the PFM to its original resting tone following the voluntary contraction. Also includes the ability to maintain PFM relaxation in anticipation of or during any type of touch. ***(NEW)***

2.6.2.3 PFM response to increased intra-abdominal pressure: for example, strain/Valsalva/cough aspects to assess

2.6.2.3.1 **Direction of contraction** (elevation, descent)

2.6.3 Diagnoses related to PFM examinations

2.6.3.1 **Overactive pelvic floor muscles:** Pelvic floor muscles which do not relax, or may even contract when relaxation is functionally needed, for example, during voiding or defecation. ***(CHANGED)***

2.6.3.2 **Underactive pelvic floor muscles:** Pelvic floor muscles which cannot voluntarily contract when instructed to do so or when required. ***(CHANGED)***

2.7 Frequency-Volume Chart/Bladder Diary

2.7.1 **Frequency-volume chart (FVC)**:[3,5,18,48] The recording of the time of each micturition together with the volume voided for at least 24 h. Ideally a minimum of three days of recording (not necessarily consecutive) will generally provide more useful clinical data. It is relevant to discriminate daytime and nighttime micturition.

2.7.2 **Bladder diary**: Adds to the FVC above, the fluid intake, pad usage, incontinence episodes, the degree of incontinence and the circumstances at the time of the leakage**.** ** Signs where FVC or Bladder diary are important. Episodes of urgency and sensation might also be recorded, as might be the activities performed during or immediately preceding the involuntary loss of urine. Additional information obtained from the bladder diary involves: Severity of incontinence in terms of leakage episodes and pad usage.

2.7.2.1 **Daytime**:[18] the period between waking up with the intention of arising until going to bed with the intention of sleeping (awake hours). ***(NEW)***

2.7.2.2 **Night-time**:[18] The individual's main daily period of sleep. It commences at the time of going to bed with the intention of sleeping and concludes when the individual decides to no longer attempt to sleep and rise for the next day. ***(CHANGED)*** FN2.15, FN2.16

2.7.2.3 **Main sleep period**:[18] The period from the time of falling asleep to the time of rising for the next day.

2.7.2.4 **Nocturnal**: Occurring or active at night.[1] For example, symptoms and signs that occur at night.[18] ***(CHANGED)***

2.7.2.5 **Daytime (urinary) frequency**:[3,5] Number of voids during daytime (awake hours including first void after waking up from sleep and last void before sleep)**.

2.7.2.6 **Night-time (urinary) frequency**:[18] Total number of night-time voids irrespective of sleep.**

2.7.2.7 **Nocturia:** The number of times an individual passes urine during their main sleep period, from the time they have fallen asleep up to the intention to rise from that period. This is derived from the bladder diary.[18]

2.7.2.8 **24-hour (urinary) frequency**:[3,5,18,48] Total number of daytime and night-time voids during a specified 24-hour period.** ***(CHANGED)***

2.7.2.9 **24-hour urine volume**:[18] Summation of all urine volumes during a specified 24 h period. The first void after rising is discarded and the 24-hour period begins at the time of the next void and is completed by including the first void, after rising, the following day.** ***(CHANGED)***

2.7.2.10 **Maximum voided volume**: Highest voided volume recorded during the assessment period. ***(CHANGED)*** This usually equals bladder capacity.**

2.7.2.11 **Average voided volume**: Summation of volumes voided divided by the number of voids during the assessment period.** ***(CHANGED)***

2.7.2.12 **Mean maximum voided volume (functional capacity)**: Mean maximum voided volume in everyday activities.**

2.7.2.13 **Polyuria**: Excessive production of urine.[1,3,5] It has been defined as more than 40 mL urine/kg body weight during 24 h or 2.8 L urine for a man weighing 70 kg.[48]

2.7.2.14 **Nocturnal urine volume**:[18] Total volume of urine produced during the night. Volume measurement begins after last void preceding sleep and concludes after the first day-time void (when the individual decides to no longer attempt to sleep). FN2.16 **

2.7.2.15 **Nocturnal (night-time) polyuria**:[18,48] ** Increased proportional production of urine during the night-time compared with the 24 h urine volume. FN2.17 (***CHANGED***). Nocturnal polyuria index (NPi) is most commonly used definition (Night-time urine volume/24 h urine volume) $\times$ 100%.
- 33% in elderly, eg, >65 years;
- >20% in younger individuals
- 20-33% in "middle age"

Figure 1 (below): provides an example of a bladder diary.

2.7.2.16 **Pad Testing:** For individuals with urinary (fecal) incontinence symptoms, the quantification of the amount of urine (feces) lost over the duration of testing, by measuring the increase in the weight of the pads (weighed pre- and post-testing) used. This may give a guide to the severity of incontinence. Different durations from a short (1 h) test to a 24 and 48-hour tests have been used with provocation varying from normal everyday activities to defined regimens. FN2.18

DATE/TIME DD.MM.YY	LIQUID INTAKE (mL)	VOLUME OF URINE (mL)	LEAKS	PAD CHANGE
21.02.18			☆	
02:15		150		
07:15		250		
08:00	Mug 250 mL			
08:20		60	☆	PC
09:30	Cup 200mL*		☆	
10:00		100		
12:00	2 mugs 500mL*			
14:00		300		
14:30		20		
15:30	Cup 200 mL		☆	PC
16:00		100	☆	
18:00	Cup 200 mL			
19:00		100		
20:00	Glasss 200 mL	20		
20:30	Glass (wine) 50 mL		☆	
22:00				PC
23:00		150		

FIGURE 1 Bladder diary: This simple chart allows you to record the fluid you drink and the urine you pass over 3 days (not necessarily consecutive) in the week prior to your clinic appointment. This can provide valuable information. (i) Please fill in approximately when and how much fluid you drink, and the type of liquid. (ii) Please fill in the time and the amount (in mLs) of urine passed, and mark with a star if you have leaked or mark with a "PC" if you have needed to change your pad (Please find below an example of how to complete this form).
Frequency = 9; Nocturia = 1; Urine production/24hr = 1250 mL; maximum voided volume = 300 mL; average voided volume = 125 mL

Footnotes for Section 2

2.1: There is little evidence from clinical trials that carrying out a clinical examination improves care, but general consensus suggests that it remains an essential part of assessment of men with urinary incontinence[2] or other LUTS.

2.2: A normal bladder in the adult cannot be palpated or percussed until there is at least a volume of 150 mL of urine. At larger volumes of about ≥500 mL, a distended bladder may be visible in thin patients as a lower midline abdominal mass. Percussion is better than palpation for diagnosing a distended bladder. The examiner begins by percussing just above the symphysis pubis and continues cephalad until there is a change in tone from dull to resonant.[30]

2.3: If phimosis is severe, this can cause voiding symptoms. Most penile cancers occur in uncircumcised men and arise on the prepuce or glans and may be associated with voiding symptoms.[33]

2.4: Scrotal abnormalities can help in elucidating lower urinary tract symptoms in men. For example, men with epididymitis may have associated urinary infection symptoms secondary to coliform bacteriuria.[34]

2.5: Isolated orchitis secondary to UTI is rare, however, mycobacterial infection, mumps, and BCG treatment may cause orchitis.[34]

2.6: If very large they may distort the scrotum and urethra and interfere with normal voiding. A hydrocele is sometimes secondary to testis tumor or inflammatory processes in the epididymis or orchitis.

2.7: The presence of hernias, cystic swellings in the scrotum, and testicular tumors should be excluded by careful clinical examination.

2.8: During the DRE, prostate size and consistency can be estimated, although DRE tends to underestimate true prostate size.[35,36]

2.9: In patients with recto-urethral fistulas, the fistula can occasionally be palpated in the anterior rectal wall. The site of the fistula at or above the anal sphincter can occasionally be noted along with the degree of induration of the anterior rectal wall. With large fistulas the urethra can be palpated, especially if there is a Foley catheter in place.

2.10: For example, a person with Parkinson's may be unable to perform intermittent catheterization because of tremor. A focused neurological exam is also recommended, especially in patients suspected of having neurogenic bladder dysfunction.[38] Decreased perineal sensation and anal sphincter tone may be signs of neuropathy.[41]

2.11: This reflex is most commonly tested by placing a finger in the rectum and then squeezing the glans penis. If a Foley catheter is in place, the BSR can also be elicited by gently pulling on the catheter. If the BSR is intact, tightening of the anal sphincter should be felt and/or observed.[39] The BSR tests the integrity of the spinal cord-mediated reflex arc involving S2-S4 and may be absent in the presence of sacral cord or peripheral nerve abnormalities.[39]

2.12: If the patient has had previous urethral or bladder surgery or trauma, the examiner should ascertain whether urinary leakage occurs through a fistula in a scar, or at any other site in the penis, perineum, groins, or lower abdomen.

2.13: Normally there is inward (cephalad) movement of the perineum and anus.

2.14: This is all part of doing a DRE, assessing anal sphincters and puborectalis.

2.15: For the purposes of the nocturia terminology, night-time is therefore defined by the individual's sleep cycle, rather than the solar cycle (from sunset to sunrise). Thus, some shift workers may have their "night" period during the daylight hours, as it is the time of their main sleep period.[18]

2.16: Volume measurement begins after the last void preceding sleep and concludes after the first daytime void. The first daytime void follows the individual's decision they will no longer attempt to sleep.[18]

2.17: There are several definitions in the literature that could be used to indicate nocturnal polyuria including:[18]

Nocturnal urine production based on body weight of greater than 10 mL/kg.[49]

1. Rate of nocturnal urine production >90 mL/hr.[50] This is suggestive of nocturnal polyuria in men (about 450 mL per 8 h' sleep).[51] There are no studies looking at the rate of nocturnal urine production in women and this may well be different from that in men.
2. Nocturnal polyuria index is the most commonly used definition for nocturnal polyuria[52] (nocturnal urine volume/24-hour voided volume) based on nocturnal urine volume as part of total 24-hour urine volume (age dependent).
3. Nocturia index (nocturnal urine volume/maximum voided volume)[53] >1: nocturia occurs because maximum voided volume is smaller than nocturnal urine volume. >1.5: nocturia secondary to nocturnal urine over-production in excess of maximum bladder capacity, that is, nocturnal polyuria.

2.18: A pad test quantifies the severity of incontinence and may be the most objective measure of the incontinence. Severity of incontinence (quantified by pad weight) affects surgery outcomes. The 24-hour pad test and micturition diary are reliable instruments for assessing the degree of urinary loss and number of incontinent episodes, respectively. Increasing test duration to 48 and 72 h

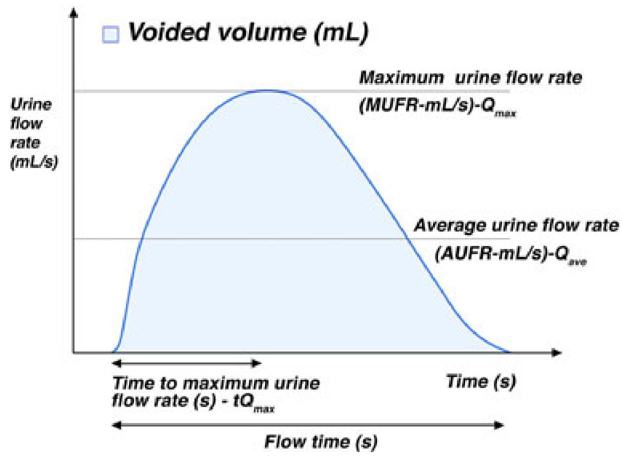

FIGURE 2 A schematic representation of urine flow over time and parameters of uroflowmetry

increases reliability but is associated with decreased patient compliance.[54] Overall, the 24-hour home test is the most accurate pad test for quantification and diagnosis of urinary incontinence because it is the most reproducible.[55] The 1-hour pad test may be used because it is easily done and standardized, however, there is no strict parallel with the 24-hour pad test and it may underestimate the weakness of the sphincter in the later part of the day.

SECTION 3: URODYNAMIC INVESTIGATIONS

Urodynamics: Measurement of all the physiological parameters relevant to the function and any dysfunction of the lower urinary tract.[56,57] $_{\text{FN3.1, FN3.2.}}$ ***(NEW)***

Clinical sequence of testing:[3,5] Urodynamic investigations generally involve an individual attending with a comfortably full bladder for free (no catheter) uroflowmetry and post-void residual (PVR) measurement prior to filling cystometry and pressure-flow study. ***(NEW)***

3.1 Uroflowmetry

3.1.1 Ideal conditions for free (no catheter) uroflowmetry: All free uroflowmetry studies should be performed in a completely private uroflowmetry room. Most modern uroflowmeters have a high degree of accuracy (+/−5%) though regular calibration is important (Figure 2) .[58]

3.1.2 Urine flow: Urethral passage of urine where the pattern of urine flow may be:[2,3,5]

3.1.2.1 Continuous: no interruption to urine flow.

3.1.2.2 Intermittent: urine flow is interrupted.

3.1.3 Urine flow rate (UFR − unit: mL/s): Volume of urine expelled via the urethra per unit time.[2,3,5]

3.1.4 Voided volume (VV − unit: mL): Total volume of urine expelled via the urethra during a single void.[2,3,5] ***(CHANGED)***

3.1.5 Maximum (urine) flow rate (MUFR − unit: mL/s) − Q_{max}: Maximum measured value of the urine flow rate[2,3,5] corrected for artefacts.[3,5]

3.1.6 Flow time (FT − unit: s): Time over which measurable flow actually occurs.[2,3,5]

3.1.7 Average (urine) flow rate (AUFR − unit: mL/s) − Q_{ave}: Voided volume divided by the flow time.[2,3,5]

3.1.8 Voiding time (VT − unit: s): Total duration of micturition, including interruptions. When voiding is completed without interruption, voiding time is equal to flow time.[2,3,5]

3.1.9 Time to maximum urine flow rate (tQmax − unit: s): Elapsed time from the onset of urine flow to maximum urine flow.[2,3,5]

3.1.10 Interpretation of the normality of free uroflowmetry: Because of the strong dependency of urine flow rates in men on voided volume[59,60] and age,[60] they are best referenced to nomograms[60–63] where the cutoff for normality has been determined and validated. The individual should comment whether voiding was representative of his usual urine flow and whether he has diurnal variation in urine flow (Figure 3A, B). ***(NEW)***

Figure 3A: the Liverpool nomograms[60] for the maximum urine flow (Q_{max}) in men aged up to 50 years (mean 35 years). ***(NEW)***

Figure 3B: the Liverpool nomograms[60] for the maximum urine flow rate (Q_{max}) in men aged over 50 years (mean 60 years). ***(NEW)***

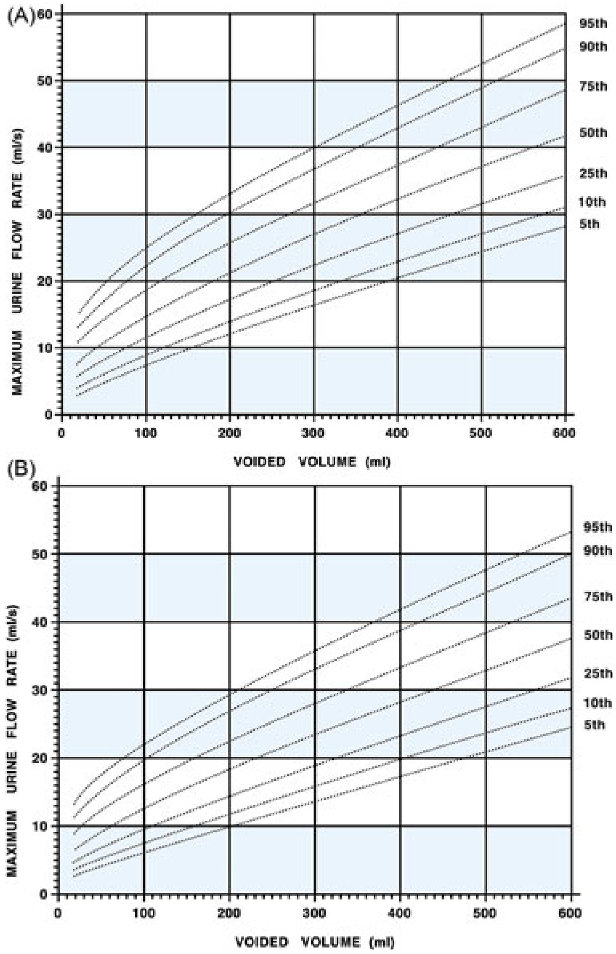

FIGURE 3 A and B, show the Liverpool nomograms[60] for the maximum urine flow rate in men (i) up to 50 years (mean 35 years) and (ii) over 50 years (mean 60 years). Equation for the maximum urine flow rate nomogram (divided by age as above) is: $\text{Sq Root (MUFR)} = 2.37 + 0.18 \times \text{Sq Root (Void volume)} - 0.014 \times \text{age}$. (Root mean square error: 0.727) ***(NEW)***. References to a specific urine flow rate as the lower limit of normal provided a specific volume has been voided require validation studies

The 25th percentile appeared to be most appropriate lower limits of normality for both urine flow rates to identify those men more likely to have voiding dysfunction (more commonly bladder outlet obstruction [BOO]).[64] Higher urine flow rate percentiles occurred in men with detrusor overactivity.[64] $_{FN3.3}$ Some racial differences in urine flow rates have been reported. $_{FN3.4}$ Ideally, abnormal uroflowmetry studies should be repeated. ***(NEW)***

3.2 Post-void residual (urine volume, PVR – unit: mL): Volume of urine left in the bladder at the completion of voiding[2,3,5]

3.2.1 Conditions for PVR measurement: PVR reading is erroneously elevated by delayed measurement due to additional renal input (1-14 mL/min) into the bladder. $_{FN3.5}$ Ultrasonic techniques allow immediate (within 60 s of micturition) measurement to minimize the error. Immediate insertion of a transurethral catheter for bladder drainage can still provide an effective and accurate PVR measurement. All urethral catheters, however, may not be of equal drainage efficacy $_{FN3.6.}$ Ultrasound PVR measurement should ideally be repeated at least once if PVR is present. ***(NEW)*** An overdistended rather than "comfortably full" bladder might lead to a falsely elevated initial PVR, assessed further by repeat voiding/ repeat PVR.

3.2.2 Assessment of normality of PVR: Upper limits in normal community dwelling men without LUTS are age dependent with studies reporting a cut-off value of 10–30 mL[67–70]. *There are no adequate currently available data from which to quote expected/typical ranges of PVR in men with symptoms of lower urinary tract dysfunction.* Such studies would need to reflect the accuracy of measurement, including whether the PVR measurement is "immediate" (eg, by ultrasound) or by urethral catheterization (unless also "immediate"). In the absence of such studies, our consensus view is that a PVR (ultrasound) over 50 mL, following double voiding, might prompt the suspicion of voiding dysfunction. ***(NEW)***

3.3 Cystometry – General[2,3,5,56,57]

3.3.1 Urodynamic studies: These usually take place in a special clinical room (urodynamic laboratory) and involve (artificial) bladder filling with a specified liquid (ICS recommends physiological saline solution or X-ray contrast if video studies) at a specified rate[2,3,56,57]. $_{\text{FN3.7}}$

3.3.2 Cystometry: Measurement of the pressure-volume relationship of the bladder during filling.[2,3,56,57] $_{\text{FN3.7}}$

3.3.3 Cystometrogram (CMG): Graphical recording of the bladder pressure(s) and volume(s) over time.[2,3,56,57]

3.3.4 Conditions for cystometry including

3.3.4.1 Pressures (zeroing);*

3.3.4.2 Pressure transducers;*

3.3.4.3 Catheter mounted transducers; *

3.3.4.4 Initial bladder volume;*

3.3.4.5 Fluid medium* $_{\textbf{FN3.7}}$ * Covered in references[56,57]

3.3.4.6 Temperature of fluid: Fluid at room temperature is mostly used. It can be warmed to body temperature but without evidence that this influences results.[71,72] $_{\text{FN3.8}}$ ***(CHANGED)***

3.3.4.7 Position of patient: Sitting (standing) position is more provocative for abnormal detrusor activity (ie, overactivity) than the supine position. At some point in the test, filling might desirably take place with the patient standing (in those patients able to do so).[71,73] $_{\text{FN3.9}}$ ***(CHANGED)*** Many men will void standing.

3.3.4.8 Filling rate: The filling rate, including any changes during testing, should be noted on the urodynamic report[3,56,57,71,73–76] $_{\text{FN3.10.}}$ A medium fill rate (25-50 mL/min) should be applicable in most routine studies. Much slower filling rates (under 25 mL/min) are appropriate in men where there are concerns for poor compliance or with a bladder diary showing low bladder capacity or those with neuropathic bladder. A higher filling rate is greater than 50 mL/min. ***(CHANGED)***

3.3.5 Intravesical pressure (P_{ves} - unit: cm H_2O): The pressure within the bladder (as directly measured by the intravesical catheter).[2,3,56,57]

3.3.6 Abdominal pressure (P_{abd} - unit: cm H_2O): The pressure in the abdominal cavity surrounding the bladder. It is usually estimated from measuring the rectal pressure, though the pressure through a bowel stoma can be measured as an alternative. $_{\text{FN3.11}}$ The simultaneous measurement of abdominal pressure is essential for interpretation of the intravesical pressure trace.[2,3,5] Artifacts on the detrusor pressure trace may be produced by a rectal contraction.[2,3,56,57] ***(CHANGED)***

3.3.7 Detrusor pressure (P_{det} - unit: cm H_2O): The component of intravesical pressure that is created by forces in the bladder wall (passive and active). It is calculated by subtracting abdominal pressure from intravesical pressure ($P_{det} = P_{ves}$-P_{abd}).[2,3,56,57] $_{\text{FN3.12}}$

3.4 Filling Cystometry[2,3,56,57]

3.4.1 Filling cystometry: Pressure-volume relationship of the bladder during bladder filling. It begins with the commencement of filling and ends when a "permission to void" is given by the urodynamicist[2,3,5,56,57] or with incontinence (involuntary loss) of the bladder content (Figure 4) .[71] ***(CHANGED)***

3.4.2 Aims of filling cystometry: To assess bladder sensation, bladder capacity, detrusor activity and compliance as well as to document (the situation of and detrusor pressures during) urine leakage. ***(CHANGED)***

3.4.3 Bladder sensation during filling cystometry: Usually assessed by questioning the individual in relation to the fullness of the bladder during cystometry.

3.4.3.1 First sensation of bladder filling: The feeling when the individual first feels bladder filling.[3,5,71,75] $_{\text{FN3.13}}$

3.4.3.2 First desire to void: The first feeling that the individual may wish to pass urine.[3,5] $_{\text{FN3.13}}$

3.4.3.3 Normal desire to void: The feeling that leads the individual to pass urine at the next convenient moment, but voiding can be delayed if necessary.[3,5]

3.4.3.4 Strong desire to void: The persistent desire to pass urine without the fear of leakage.[3,5,71] FN 3.13

3.4.3.5 Urgency: Sudden, compelling desire to void which is difficult to defer.[3,5] FN1.4, FN1.5

3.4.3.6 Bladder oversensitivity[5]–Increased bladder sensation during bladder filling with: ***(NEW – male)***

- earlier first desire to void;
- earlier strong desire to void, which occurs at low bladder volume;
- lower maximum cystometric bladder capacity (**3.4.4.2**);
- no abnormal increases in detrusor pressure.

3.4.3.7 Reduced bladder sensation: Bladder sensation perceived to be diminished during filling cystometry.

3.4.3.8 Absent bladder sensation: No bladder sensation during filling cystometry, at least to expected capacity of 500 mL.

3.4.3.9 Pain: the complaint of pain during filling cystometry is abnormal. Its site, character and duration should be noted.

3.4.4 Bladder capacity during filling cystometry[3,5,56,57]

3.4.4.1 Cystometric capacity (units: mL): Bladder volume at the end of filling cystometry, when a "permission to void" is usually given by the urodynamicist. This endpoint and the level of the individual's bladder sensation at that time, for example, "normal desire to void," should be noted. This endpoint might be higher than normal in men with reduced bladder sensation.

3.4.4.2 Maximum cystometric capacity (units: mL): In individuals with normal sensation, this is the volume when one can no longer delay micturition during filling cystometry. FN3.14, FN3.15, FN3.16

3.4.5 Detrusor function during filling cystometry

3.4.5.1 Normal detrusor activity/function:[3,5] There is little or no change in pressure with filling. There are no detrusor contractions, spontaneous or provoked with activities such as postural changes, coughing or hearing the sound of running water. FN3.17 ***(CHANGED)***

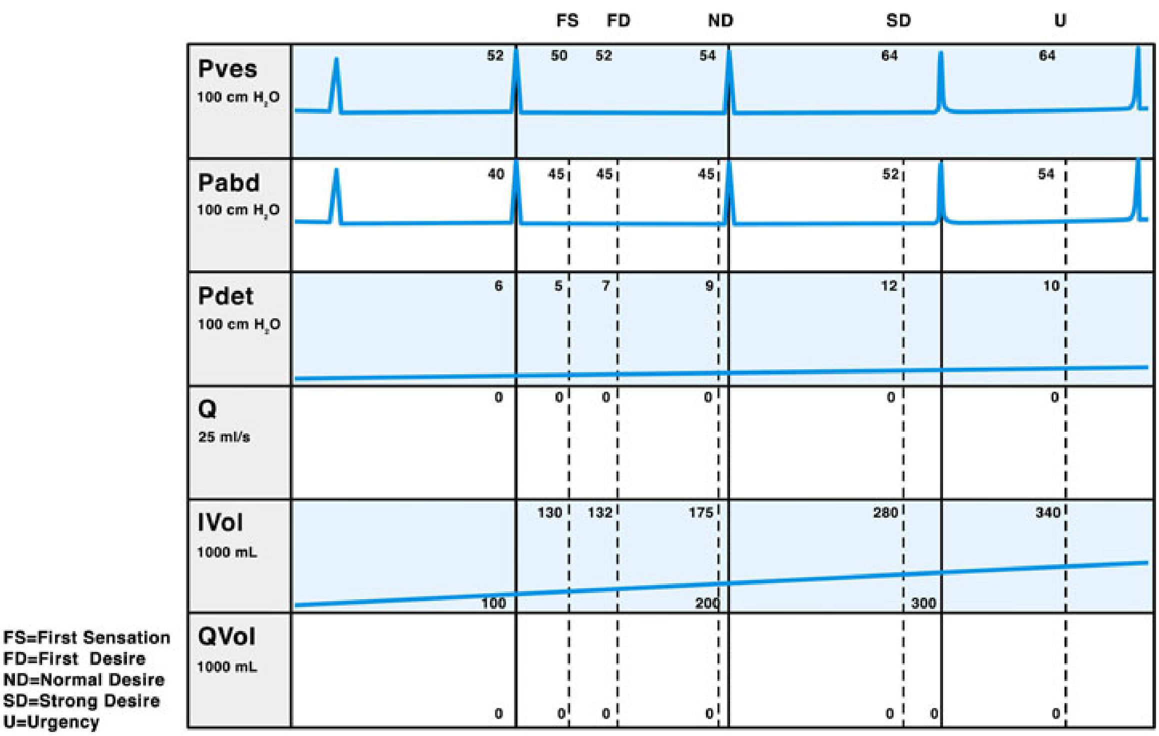

FIGURE 4 Normal filling cystometry on multichannel urodynamics. (first desire 132 mL, normal desire to void 175 mL, strong desire to void 280 mL, urgency 340 mL. Detrusor contraction is absent during filling cystometry). Cough artefacts and good subtraction of P_{abd} from P_{ves} to get P_{det} are demonstrated

3.4.5.2 Detrusor overactivity (DO):[3,5] The occurrence of detrusor contraction(s) during filling cystometry. These contractions, which may be spontaneous or provoked, produce a wave form on the cystometrogram, of variable duration and amplitude. The contractions may be phasic or terminal. They may be suppressed by the patient or uncontrollable ***(CHANGED)***. Symptoms, for example, urgency and/or urgency incontinence or perception of the contraction may (note if present) or may not occur.

3.4.5.2.1 Idiopathic (primary) detrusor overactivity: No identifiable cause for involuntary detrusor contraction (s). ***(CHANGED)*** (Figure 5)

3.4.5.2.2 Neurogenic (secondary) detrusor overactivity:[3,5,13,] Detrusor overactivity and evidence (history; visible or measurable deficit) of a relevant neurological disorder. ***(CHANGED)***

3.4.5.2.3 Non-neurogenic (secondary) detrusor overactivity: An identifiable possible non-neurological cause exists for involuntary detrusor contraction(s) during bladder filling. For example, functional (obstruction); stone, tumor (eg, carcinoma in situ), UTI. FN3.18 ***(CHANGED)***

3.4.6 Bladder (detrusor) compliance (unit: mL/cm H_2O)[3,5,56,57,77–79]

3.4.6.1 Description: Relationship between the change in bladder volume and simultaneous change in detrusor pressure as a measure for the distensibility of the bladder.[3,5]

3.4.6.2 Calculation: Divide the change of volume (ΔV) by the simultaneous change in detrusor pressure (ΔP_{det}) during filling cystometry – ($C = \Delta V/\Delta P_{det}$). The compliance reflects the amount of fluid in the bladder to increase bladder pressure by 1 cm H_20 and is expressed as mL per cm H_2O.

3.4.6.3. Factors affecting the measurement of bladder compliance:

3.4.6.3.1 Bladder filling speed: The bladder should be filled at up to 50 mL/min if there is no

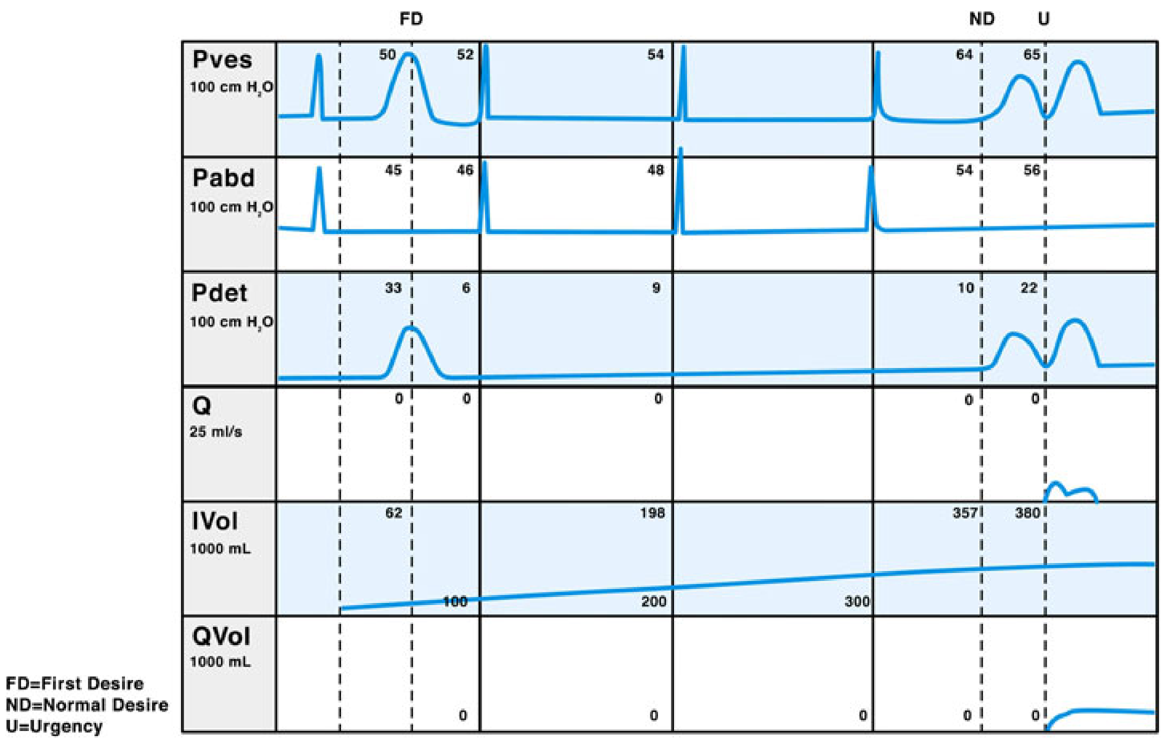

FIGURE 5 Filling cystometry demonstrating detrusor overactivity: First desire to void occurred at 62 mL together a contraction; normal desire to void at 357 mL; urgency at 380 mL followed by a detrusor contraction There is also high pressure – slow flow during voiding

reason to suspect poor bladder compliance. Faster filling is more provocative and may artificially reduce bladder compliance. This artifact may settle when filling is interrupted or repeated with slower speed. ***(CHANGED)***

3.4.6.3.2 Contractile/relaxant properties of the detrusor (decreased compliance): Properties of the bladder wall may reduce compliance, for example, pelvic radiation or chemotherapy or bladder overstretch. ***(CHANGED)*** Bladder outlet obstruction can result in detrusor muscle hypertrophy, intramural collagen and elastin deposition and contribute to reduced compliance. ***(NEW)***

3.4.6.3.3 Other factors affecting bladder compliance[78] (increased compliance): Bladder diverticula (also pseudodiverticula) and vesico-ureteric reflux (high grade). ***(NEW)***

3.4.6.4 Starting point for compliance calculations: Usually the detrusor pressure at the start of bladder filling and the corresponding bladder volume (usually zero).[3] Special attention should be made to ensure bladder is emptied at the commencement of measurement; incomplete emptying may artificially decrease bladder compliance. ***(CHANGED)***

3.4.6.5 End point for compliance calculations: Detrusor pressure (and corresponding bladder volume) at cystometric capacity (allow time for pressure to settle after cessation of filling). Both points are measured excluding detrusor contraction. In the case of detrusor overactivity with leakage, both points should be measured or immediately before the start of any detrusor contraction (and therefore causes the bladder volume to decrease, affecting compliance calculations). Low compliance has been defined (in women) as bladder compliance <10 mL/cm H_2O (neurogenic) or <30 mL/cm H_20 (non-neurogenic). Normal compliance is >30 mL/cm H_2O (neurogenic) and 40 mL/cm H_20 (non-neurogenic).[79] Recommended values in men have not been well-defined. $_{FN3.19}$ ***(CHANGED)***

3.4.7 Repeat Cystometry: $_{FN3.20}$ The repetition of the urodynamic testing when abnormal bladder function, discrepancies between history and suspected urodynamic findings, technical errors and/or artifacts have been observed at immediate post-test analysis. ***(CHANGED)***

3.4.8 ICS Standard Urodynamic Test:[57] Free uroflowmetry, postvoid residual, cystometry, and pressure-flow study are termed ICS standard urodynamic test (ICS-SUT).$_{FN3.21}$ ***(CHANGED)***

3.5 Urethral function during filling cystometry (filling urethro-cystometry): As filling urethro-cystometry is less well-explored in men than women, readers are referred to other reports for methodology.[56,57,80]

3.6 Urethral closure mechanism

3.6.1 Normal urethral closure mechanism: A positive urethral closure pressure is maintained during bladder filling, even in the presence of increased abdominal pressure, although it may be overcome by detrusor overactivity.

3.6.2 Incompetent urethral closure mechanism: Leakage of urine occurs during activities which might raise intra-abdominal pressure in the absence of a detrusor contraction.

3.6.2.1 Urodynamic stress incontinence (USI): Involuntary leakage of urine during filling cystometry, associated with increased intra-abdominal pressure, in the absence of a detrusor contraction.

3.6.2.2 Subtype: Intrinsic sphincter deficiency (ISD): Very weakened urethral closure mechanism.

3.6.3 Leak point pressures:[2,3,5,80,81,82] There are two types of leak point pressure measurement. The pressure values at leakage should be measured at the moment of leakage.

3.6.3.1 Detrusor leak point pressure (DLPP – unit: cm H_2O): This is a static test. The pressure is the lowest value of the detrusor pressure at which leakage is observed during cystometry in the absence of increased abdominal pressure. DLPP is a reflection of the resistance of the bladder outlet or urethral sphincter. High DLPP (eg, over 40 cm H_20[80]) may put patients at risk for upper urinary tract deterioration, or secondary damage to the bladder in the cases of known underlying neurological disorders such as spinal cord injury or MS.[81] There are no data on any correlation between DLPP and upper tract damage in non-neurogenic patients. ***(CHANGED)***

3.6.3.2 Abdominal leak point pressure (ALPP – unit: cm H_2O): This is a dynamic test. It is the intentionally increased abdominal pressure that provokes urinary leakage in the absence of a detrusor contraction.[82] The patient can achieve this by coughing (CLPP) or straining (Valsalva Leak Point Pressure – VLPP). The VLPP allows measuring the lowest pressure (measured by the bladder or abdominal pressure) that causes urine leakage.

3.7 Pressure-Flow Studies[2,3,5,56,57] FN3.24

3.7.1 Pressure-flow studies: Pressure-volume (urinary flow) relationship of the bladder during voiding.[1–3,5,56,57] It begins when the "permission to void" is given by the urodynamicist and ends when the man considers his voiding has finished. Measurements to be recorded should be the intravesical (P_{ves}) and abdominal (P_{abd}) pressures and calculate the detrusor pressure (P_{det}) as well as the urine flow rate. FN3.22 **(*CHANGED*)**

3.7.2 Detrusor pressure and other measurements during pressure-flow studies (Figure 6)[2,3,5,56,57]

3.7.2.1 Detrusor opening pressure (unit: cm H_2O): Detrusor pressure recorded immediately before the commencement of urine flow. ***(CHANGED)***

3.7.2.2 Flow delay (unit: s): The time elapsed from initial rise in pressure to the onset of flow. This is the initial isovolumetric contraction period of micturition. It reflects the time necessary for the fluid to pass from the point of pressure measurement to the uroflow transducer. FN3.23 ***(CHANGED)***

3.7.2.3 Urethral opening pressure ($P_{det.uo}$– unit: cm H_2O): Detrusor pressure recorded at the onset of measured flow (consider time delay – usually under 1 s).

3.7.2.4 Maximum detrusor pressure ($P_{det.max}$– unit: cm H_20): Maximum registered detrusor pressure during voiding.

3.7.2.5 Detrusor pressure at maximum flow ($P_{det.Qmax}$ – unit: cm H_2O): Detrusor pressure recorded at maximum urine flow rate.

3.7.2.6 Detrusor pressure at end of flow ($P_{det.ef}$– unit: cm H_2O): Detrusor pressure recorded at the end of urine flow.

3.7.2.8 Postvoiding detrusor contraction: An increase in detrusor pressure (P_{det}) following the cessation of urinary flow ***(NEW)***

3.7.3 Detrusor function during voiding[2,3,5,56,57]

3.7.3.1 Normal detrusor contractile function: Normal voiding in men is achieved by an adequate continuous detrusor contraction that leads to complete bladder emptying within a normal time span. It depends on central initiation and stimulation of the reflexes involved. The amplitude of the detrusor contraction (detrusor contraction strength/power) tends to increase in response to any increased urethral resistance until the bladder is empty.[83] ***(CHANGED)***

3.7.3.2 Detrusor underactivity (DU): Low detrusor pressure or short detrusor contraction time, usually in combination with a low urine flow rate resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span. (c.f. the term "hypocontractile detrusor" or detrusor hypocontractility describes a detrusor contraction of reduced strength). Detrusor underactivity can be of neurogenic[13,84] or non-neurogenic origin. ***(CHANGED)***

3.7.3.3 Acontractile detrusor: The detrusor cannot be observed to contract (ie, no increase in P_{det}) during urodynamic studies resulting in failure to void

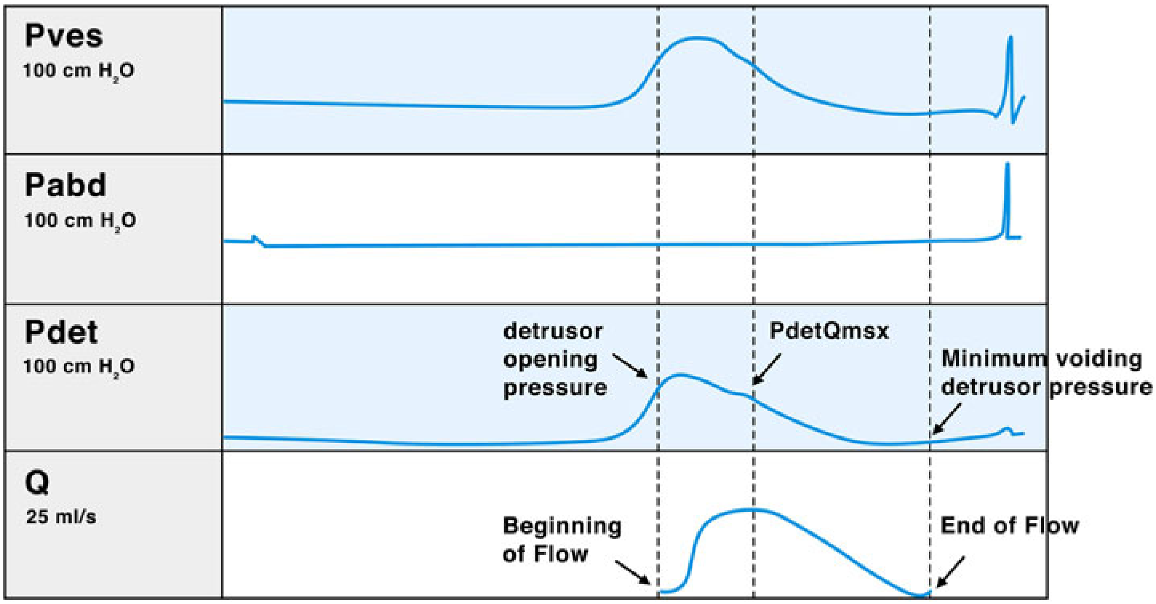

FIGURE 6 A schematic diagram of a pressure-flow study

(CHANGED). Limited voiding may occur by straining. The possibility of "inhibition" of a detrusor voiding contraction must be considered if the man subsequently voids normally post-cystometry. An acontractile detrusor can be of neurogenic or non-neurogenic origin. Neurogenic acontractile detrusor should replace the term "detrusor areflexia."

3.8 Urethral function during voiding: This can be interpreted by the pressure-flow trace assisted at times by video cysto-urethrography (video-urodynamics – **4.3.4**) and electromyography (EMG – **3.9**) as available.

3.8.1 Normal urethral function during voiding: Initiation of voiding begins with voluntary relaxation of the pelvic floor and striated sphincters (rhabdosphincter). The bladder then contracts with the bladder neck, the latter then opening due to its spiral arrangement of fibres. Voiding is prompted with the urethra being continuously relaxed to allow micturition at a normal detrusor pressure and urine flow, resulting in complete bladder emptying.[85,86] FN3.24, FN3.25, FN3.26

3.8.2 Abnormal urethral function during voiding: The urethral sphincter(s) do not relax completely or they are (temporarily) contracted during voiding, resulting in increased detrusor pressure. Bladder emptying may be complete or incomplete (PVR present).

3.8.2.1 Bladder outlet obstruction (BOO):[87,88] This is the generic term for obstruction during voiding. It is a reduced urine flow rate with a simultaneously increased detrusor pressure FN3.27. The Bladder Outlet Obstruction Index (BOOI = $P_{det.Qmax} - 2Q_{max}$) will give a guide to the likelihood of obstruction being present.[87]
BOOI <20 cm H_20 = non-obstruction;
BOOI 20-40 cm H_20 = equivocal;
BOOI >40 cm H_20 = obstruction)
(CHANGED)

3.8.2.2 Dysfunctional voiding: is characterized by an intermittent and/or fluctuating flow due to inadequate or variable relaxation generally of the sphincters during voiding in neurologically normal men (i.e. no historical, visible or measurable evidence of neurological disease). ***(CHANGED)*** Dysfunctional voiding may cause functional bladder outlet obstruction. This type of voiding may also be the result of an acontractile or underactive detrusor (voiding with abdominal straining). Video-urodynamics is required to diagnose primary bladder neck obstruction and/or rhabdosphincter discoordination.[87]

3.8.2.3 Detrusor sphincter dyssynergia (DSD):[88] Dyscoordination between

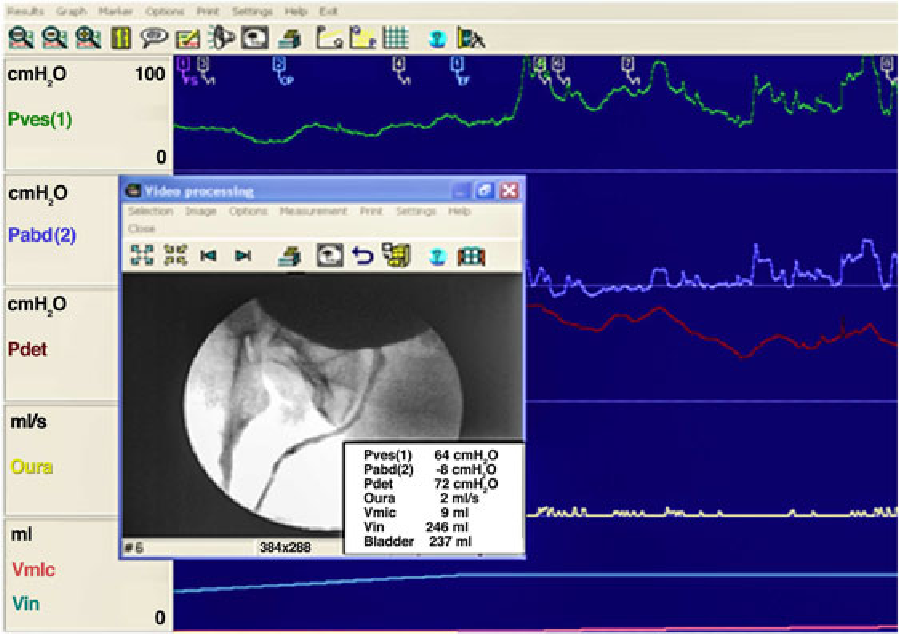

FIGURE 7 Primary bladder neck obstruction in non-neurogenic patient: Urodynamic trace plus imaging

detrusor and rhabdosphincter function during voiding due to a neurological abnormality (ie, detrusor contraction synchronous with contraction of the urethral and/or periurethral striated muscle). This is a feature of neurological voiding disorders. Neurological features should be sought.[88] Video-urodynamics **(4.3.4)** is generally valuable to conclude this diagnosis. DSD generally occurs due to a lesion above the sacral level 3 but below pons. Sphincter EMG might be helpful where facilities for video-urodynamics are unavailable.

3.8.2.4 Primary Bladder Neck Obstruction (non-neurogenic): During voiding, the bladder neck smooth muscle fails to adequately open. The detrusor pressure increases to try to overcome the resistence of the bladder neck and allow urine to flow (Figure 7).

3.8.3 Pressure-Flow Analysis Graphical presentation of the results or calculations based on the pressure-flow measurement (passive urethral

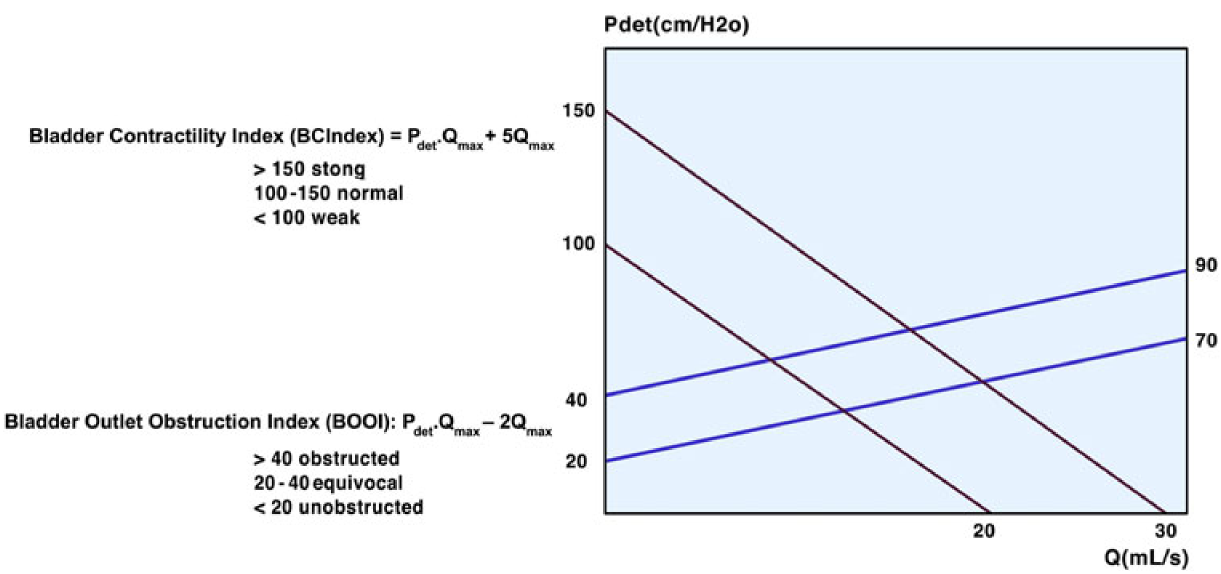

FIGURE 8 ICS Nomogram[89]

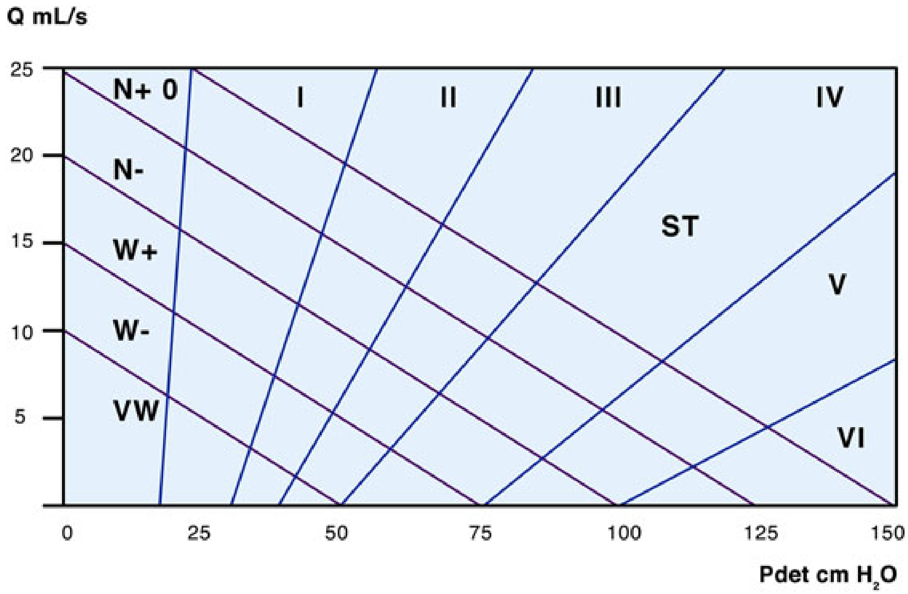

FIGURE 9 Schäfer Nomogram[90,91]

pressure relationship, PURR) have been developed into nomograms. Different nomograms use a variable amount of information of the pressure-flow plot. Figures 8–10 are available to assess bladder outlet obstruction in men[89–92]

3.8.3.1 ICS Nomogram[89]: Only P_{det} at Q_{max} is plotted into the nomogram (one point determination of bladder outlet resistence). Depending on the position of this point on the nomogram, the patient can be categorised as "unobstructed," "equivocal," or "obstructed." The calculation of BOOI is used to express bladder outlet resistence as a continuous variable. BOOI can be extracted from

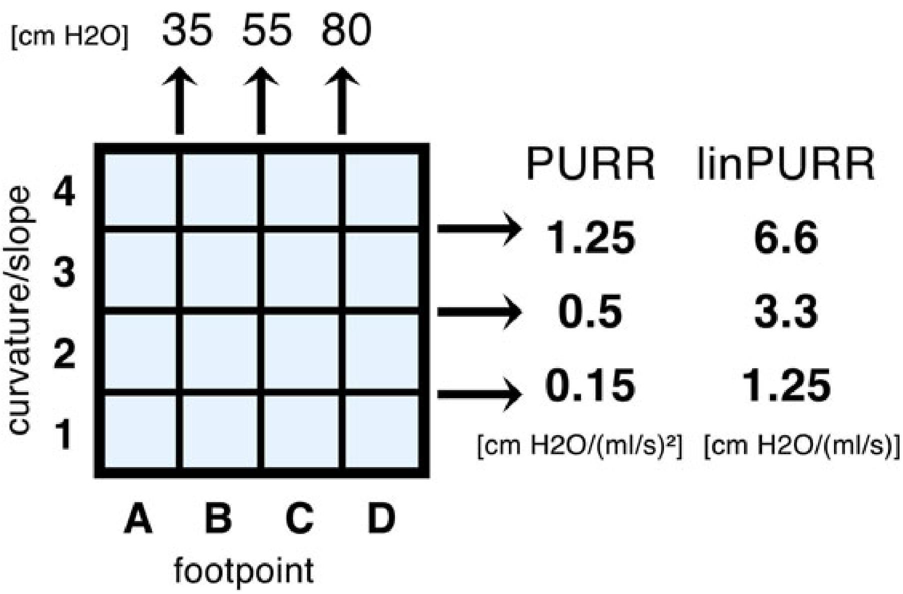

FIGURE 10 CHESS Nomogram[92] for the two-dimensional classification of bladder outlet obstruction (assessment of compressive and/or constrictive BOO). The entire information of the pressure-flow plot is used to calculate the passive urethral resistance relation (quadratic PURR, ie, the lowest detrusor pressure for each urine flow during the recorded void; multiple point determination of bladder outlet resistance). The PURR footpoint (ie, crossing-point of the PURR with the pressure-axis) and PURR curvature (ie, PURR ascent) are used to determine bladder outlet resistance. In total, 16 different fields are generated by using the threshold values indicated in the figure. Only field A1 testifies "non-obstruction"; field A2 and B1 indicate "equivocal obstruction" and all other fields indicate different types of obstruction. The increase in the footprint (A to D) indicates compressive BOO whilst the increase in the curvature (1 to 4) indicates constrictive BOO. (NEW)

the nomogram by drawing a line between $P_{det.Qmax}$ and the cutting point of the Y-axis (n.b. the line must be parallel to the lines drawn into the nomogram (ie, those for "unobstructed," "equivocal," or "obstructed"). $_{FN3.28,FN3.29,FN3.30}$ ***(NEW)***

3.8.3.2 Schäfer Nomogram[90,91]: $P_{det.muo}$ (minimal urethral opening detrusor pressure) and $P_{det.Qmax}$ (detrusor pressure at maximum urine flow) together with corresponding urine flow rates are plotted into the nomogram (2-point determination of the bladder outlet resistance). The line between the two points represents the linearized passive urethral resistance relationship (linPURR) and the location of the linPURR in the nomogram indicates the amount of bladder outlet resistance of the patient. The nomogram differentiates 7 grades of bladder outlet resistance (grades 0 and I = no bladder outlet resistance); grades II to VI indicate increasing grades of BOO. The length (endpoint) of linPURR indicates detrusor contraction strength that can be very weak (VW), weak (W), normal (N), or strong (ST). ***(NEW)***

3.9 Electromyography (EMG)

3.9.1 Purpose: Reflects the activity of the striated musculature (peri-urethral, rhabdosphincter and pelvic floor). EMG is poorly standardized with variance in the type of needle, needle versus patch electrode, and electrode placement.[93] Perineal patch electrodes are often preferred for easier placement, patient tolerance and allow greater mobility. However, they measure all the above striated musculature. In contrast, needle electrodes can be placed in the area of interest and measure activity of defined muscles or muscle groups for example, rhabdosphincter. ***(NEW)***

3.9.2 Interpretation: May be difficult due to artifacts introduced by other equipment. In the urodynamic setting, an EMG is useful as a gross indication of the patient's ability to control the pelvic floor. ***(NEW)***

3.9.3 Detrusor-sphincter dyssynergia (DSD): Simultaneous contraction of the detrusor and (rhabdosphincter) urethral sphincters with the evidence of a neurological disorder (either visible or measurable neurological deficit or a history of neurological disease). The classification of DSD can be divided into two groups continuous versus intermittent. DSD type and degree of SCI lesions seem to correlate.[93,94] ***(NEW)***

3.9.3.1 Type 1 DSD occurs in patients with incomplete neurological lesions. Type 1 – there is a progressive increase in external urinary sphincter (EUS) contraction activity that peaks at maximal detrusor contraction followed by sudden relaxation of the EUS as the detrusor pressure declines allowing urination (Figure 12). ***(NEW)***

3.9.3.2 Type 2 DSD occurs more often in patients with complete lesions. Type 2 – occurs with continuous EUS contraction throughout the entire detrusor contraction resulting in urinary obstruction or inability to urinate.[93,94] ***(NEW)***

3.10 Ambulatory urodynamics: A functional test of the lower urinary tract for which a transurethral catheter is placed in the bladder (and, in some protocols, another one in the rectum as is typical for a urodynamic study) performed outside the clinical setting, involving natural bladder filling by drinking and continuous recording of the bladder pressure (P_{ves}) for a longer period of time (eg, 12 h). Ambulatory urodynamics can reproduce bladder function and urine loss during the individual's normal everyday activities. ***(CHANGED)***

3.11 Non-invasive urodynamics: The penile cuff[95] and condom catheter[96] and urethral device[97] have been developed as non-invasive alternatives to pressure-flow studies. The principle of these tests is to interrupt the flow and measure the bladder pressure. The detrusor contraction is maintained and the urethral sphincter remains open; the column of fluid from the urethra to the bladder is sufficient to measure the bladder pressure (isovolumetric pressure). The external pressure on the urethra, which is needed to interrupt the flow, should be identical to the pressure in the bladder (ie, isovolumetric bladder pressure – $P_{ves.iso}$). Therefore, $P_{ves.iso}$ provides information on bladder pressure during voiding and, when urinary flow is also measured, it is able to distinguish between obstruction and non-obstruction (Figure 11). ***(NEW)***

3.12 Videourodynamics (Fluorourodynamics): Functional test of the lower urinary tract in which filling

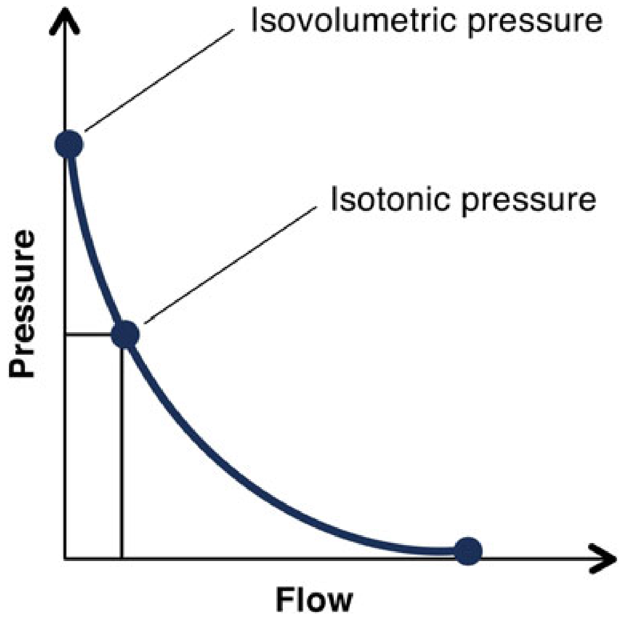

FIGURE 11 Isometric and isotonic pressure are indirectly related to the condition of the muscles fibers (detrusor). The isometric contraction of the detrusor, that is contraction without length modification or without shortening of the muscle fibers. Isovolumetric pressure is established by the isometric contraction of the detrusor (no flow). Isotonic contraction is developing force with length modification and therefore, shortening the muscle fibers. In this case, the isotonic pressure is referring to the fact that it is being developed in the voiding phase

cystometry and pressure-flow studies (and possibly EMG) are combined with real-time imaging of the lower urinary tract (Figure 12). (see **4.3.3**). ***(CHANGED)***

3.12.1 Bladder neck at rest: Shut and competent on coughing and straining, possible exception post-prostatectomy.

3.12.2 Bladder neck during voiding: Bladder neck opens like a funnel.

3.12.3 Bladder neck obstruction during voiding: Bladder neck remains closed.

Footnotes for Section 3

3.1: Urodynamics is the general term to describe all the measurements that assess the function or dysfunction of the LUT by the measurement of relevant physiological parameters.[56,57]

3.2: Urodynamic tests: Over the years, a variety of terms have been developed for the group of diagnostic tests that evaluate LUT function: uroflowmetry, post void residual (PVR), cystometry, pressure-flow studies, electromyography (EMG), urethral pressure profile (UPP), and videourodynamics (videocystourethrography – VCU) are the terms most frequently used in the scientific literature.[56,57]

3.3: Men with detrusor overactivity had the highest urine flow rates. Detrusor overactivity (previously "instability") was present in 71% of men with centile rankings for the maximum urine flow rate over 50 mL/s.[64]

3.4: There is a notable difference between the available nomograms (Liverpool, Siroky, and Bristol), particularly between race and in older patients.[60–63]

3.5: These are figures for maximal diuresis in women in response to fluid loads of 500 mL and 1000 mL.

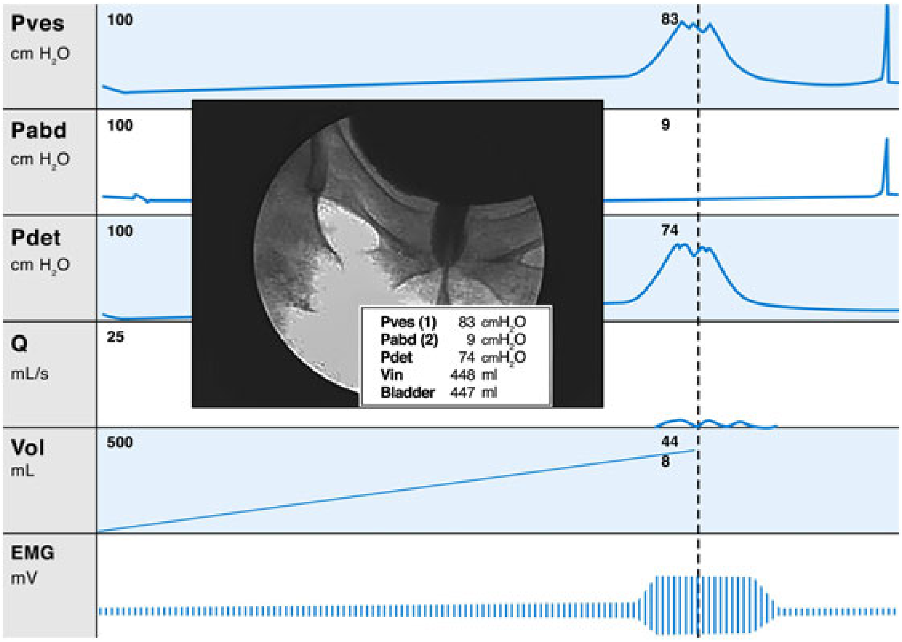

FIGURE 12 Videourodynamics with EMG: During the voiding phase, high detrusor pressure, slow urine flow, increased electrical muscle activity and the image shows dilatation of the proximal urethra and narrowing of the membranous urethra (rhabdosphincter)

Equivalent male diuresis data is unavailable.[65] However, maximum diluting capacity of urine is generally regarded as 20 L/day which converts to 13.9 mL/min (exactly the same as female data[65]).

3.6: Not all catheters empty with similar efficacy. There is evidence in women that a less-compressible (silicone or plastic) catheter is much more effective than a more compressible (latex) catheter in draining the bladder.[66] Such evidence in men is unavailable.

3.7 Continuous fluid filling of the bladder via a transurethral (or other route, eg, cystostomy or Mitrofanoff) catheter, at least with intravesical and abdominal pressure measurement and display of detrusor pressure, including cough (stress) testing. Cystometry ends with "permission to void" or with incontinence of the total bladder content. The fluid type and temperature, filling method and rate, catheter sizes, pressure recording technique, and patient position should all be specified in the urodynamic protocol.

3.8: Body temperature fluid and room temperature fluid do not differently affect bladder sensory thresholds and do not unequally provoke detrusor overactivity or lower urinary tract irritation.[71,72]

3.9: Detrusor overactivity would have been missed in 76% of cases of cystometry was done in the supine position and 60% would have been missed if the study was done supine compared to seated[71,73]. The sitting or standing position is the most representative for daily life situations and is probably the least uncomfortable and/or embarrassing for the patient.[73]

3.10: Filling rate, especially when very fast and the volume infused is much larger than the functional bladder capacity, may influence the results or the representativeness of the cystometry. Evidence that filling rate should be changed during the cystometry is lacking. Diuresis, during cystometry, adds volume that is not recorded by the urodynamic system with automated filling volume recording, but that is relevant for interpretation of the results.

3.11: There is no specific evidence, but the position of the catheter-tip is usually above the bladder in a stoma, and bowel activity may much more likely cause artifacts in those cases, hampering measurement of absolute abdominal pressures, detrusor subtraction pressure, and therefore, the interpretation.

3.12: The urodynamic pressure is the excess pressure above atmosphere at the hydrostatic level of the upper edge of the symphysis pubis. This is valid for all pressures recorded with fluid-filled lines.

3.13: Values evaluated in healthy men[75,76] (mean ± SD) are (i) First sensation of bladder filling: 222 mL ± 150 mL; (ii) First desire to void: 325 ± 140 mL; (iii) Strong desire to void: 453 ± 94 mL.

3.14: Maximum cystometric capacity that should be in healthy adult men, mean 552 mL (range 317-927 mL).[76]

3.15: Filling of more than 800 mL is seldom useful[71].

3.16: Maximum bladder capacity under anaesthetic ("anatomical bladder capacity") – the volume to which the bladder can be filled under deep general or spinal anaesthetic, without urinary leakage, is rarely reported in scientific literature but may be of relevance in interstitial cystitis.[71]

3.17: "Normo-active detrusor" as several studies have demonstrated detrusor overactivity during filling in healthy individuals.

3.18: UTI is a very uncommon cause of DO. Most centres do not do urodynamic studies in the presence of an active infection because of the risk of septicaemia.

3.19: Normal values of bladder compliance in men have not been well-defined. Bladder compliance in the volunteers was higher than usually considered normal in adults during cystometric bladder filling.[76] In 28 healthy volunteers, men with mean age of 24 years (range 19-28), the mean compliance was 56.1 mL/cm H_2O (SD 37.3). Since no precise figures exist for normal compliance in men, a prospective study of a large normal population is needed.

3.20: There is no convincing evidence that the clinical diagnosis on the basis of the first cystometry is often changed on repetition of the test. There is no definite evidence that immediate repetition of an adequately performed urodynamic test "for confirmation" is required. The recommendation of immediate repetition of the test: (i) when doubt exists as to whether the test has answered the clinical question; (ii) when technical errors and artifacts have been observed at immediate post-test analysis.

3.21: Cystometry and pressure-flow study, free uroflometry and PVR are termed ICS standard urodynamic test (ICS-SUT). This may be supplemented with other tests such as EMG, imaging, continuous urethral pressure(s), and/or urethral pressure profile measurements. All tests are performed in the patient's preferred or most usual position: comfortably seated and/or standing if possible.[56,57]

3.22: Voiding physiology depends on central neural activation, bladder contractility and coordinated urethral relaxation throughout the process. There remains much to learn about these components including central activation and its potential grading, and its role and interactions in detrusor underactivity and dysfunctional voiding.

3.23: It is usually between 0.5 to 0.8 s depending on the individual's position and the distance to the uroflowmeter.

3.24: The first "event" in voiding is relaxation of the pelvic floor. This may mean a drop in intra-abdominal pressure in the rectal line, and an associated increase in the detrusor pressure which does not imply a detrusor contraction.

3.25: As any other muscular contraction, detrusor contraction has an isometric and an isotonic component. The isometric component means that detrusor fibers do not shorten and intravesical pressure rises. The isotonic component produces changes in fiber length; there is shortening and a flow ensues. The first is represented externally as P_{ves} or P_{det} and the second by flow. In voiding cystometry, in the presence of flow, detrusor pressure is a function of these two variables, governed by urethral resistance to flow.

3.26: Voluntary interruption of voiding: If the need to interrupt the flow were to arise, contraction of the pelvic floor and urethral sphincters can do this, resulting in an isometric detrusor pressure rise. Urine in the proximal urethra is milked back into the bladder.

3.27: In men with symptoms of lower urinary tract dysfunction, urine flow (rate) and PVR are important markers of bladder outlet obstruction, but are also dependent on the central initiation and continuation of the detrusor contraction and pressure. In the original definition, only pressure and urine flow were included.

3.28: Voiding cystometry graphic presentation*:* It has been recommended to present pressure-flow studies with a plot of the flow rate (mL/s) on the X-axis and the synchronous detrusor pressure (cm H_2O) on the Y-axis in addition to the time-based graphs but the axis can be reversed. These plots can be added a cut-off value or a range of normality and equivocal zones. These cut-off values are population specific, varying widely among male patients.

The relation between detrusor pressure and generated synchronous flow indicate "*urethral resistance*." With computing, these plots can be drawn since the beginning to the end of flow. *Urethral resistance* is then appreciated graphically throughout the whole emptying phase. Most of these resistance points are considered to be driven by urethral muscular activity. The point of less calculated resistance should be taken as an approximation to the urethral resistance free of active muscular urethral and peri-urethral contractions. This concept of "*passive urethral resistance relation*" is then taken as an "anatomical obstruction" caused by fixed structures as the prostate or strictures.

Pressure-flow plots as a measure of detrusor voiding contraction. "Detrusor contractility" can be used for any method that diagnoses or aims to diagnose "intrinsic" detrusor muscle properties (eg, potential [maximum] force or velocity), by any method.

In a given group of patients the *detrusor contractility* can be calculated upon series of stop-flow or interrupted-voiding tests and mathematical or graphical analysis methods of pressure, flow and or other parameters. Cut-off values or a continuous scale of contractility can then be drawn. Independently of the magnitude of the detrusor contraction, it can be fading before the total emptying leading to incomplete voiding; "unsustained contraction" or "fading contraction" may then be used.

3.29: "ICS Nomogram" ® formerly known as Abrams-Griffiths Nomogram and "Abrams-Griffiths number" (now BOOI) is more commonly used.

3.30: Catheter flow should be compared with free flow to ascertain whether dysfunctional voiding might only occur during urodynamics due to catheter placement.

SECTION 4: IMAGING

4.1 Overview: Imaging has become increasingly important in the assessment of male lower urinary tract and pelvic floor dysfunction. Table 2 indicates possible imaging modalities by site and the main goals from kidney to pelvic floor. ***(NEW)***

Application of the individual imaging technique is dependent on the suspected abnormality, ability of the imaging technique to visualize this abnormality and image resolution. In case of competing imaging techniques, non-radiological techniques should be preferred to avoid radiation exposure. ***(NEW)***

4.2 Ultrasound Imaging

4.2.1 Ultrasound in the assessment of the lower urinary tract: As noted in Table 2, ultrasound imaging has become a relevant imaging modality in all sites that might be subject to investigation of male lower urinary tract and pelvic floor dysfunction both in the office and in the urodynamic suite. ***(NEW)***

4.2.2 Modalities in current routine clinical use:

4.2.2.1 Transrectal: Linear array or sector scanning per rectum. ***(NEW)***

4.2.2.2 Transabdominal: Curved or linear arrays applied to the abdomen. ***(NEW)***

4.2.2.3 Perineal: Curved or linear array probe applied to the perineum (transperineal). ***(NEW)***

4.2.2.4 Scrotal: Linear array probe applied to scrotum looking at testes, epididymes and intrascrotal abnormalities. ***(NEW)***

4.2.3 Current routine uses of ultrasound in male LUT/PF dysfunction

4.2.3.1 Post-void residual (PVR): Transabdominal[98,99] or transrectal[100] (see section

TABLE 2 Imaging modalities by site and goal

Location	Imaging technique	Purpose
Upper Urinary Tract	• Renal ultrasound • IVU with X-ray or CT • IVU with MRI	detects the presence and degree of hydronephrosis, urothelial carcinoma/tumors, stones, other renal or ureteric abnormalities/ diseases.
Bladder	• Ultrasound bladder scanner • Transabdominal ultrasound • Transrectal ultrasound • CT • MRI	measurement of post-void residual (PVR), detrusor or bladder wall thickness, intravesical prostatic protrusion (IPP) or bladder weight (to help judge BOO) or calcification. Evaluate the presence of other diagnoses such as neoplasm, stones or foreign bodies.
Prostate	• Transrectal ultrasound (3D, contrast-enhanced, Doppler) • Transabdominal ultrasound • MRI (T2-weighted, multiparametric, prostate segmentation, functional MRI).	evaluate prostate volume, prostate anatomy, BOO. MRI: Evaluation for prostate cancer
Scrotum	• Scrotal ultrasound	Testis, epididymis, tunica vaginalis
Urethra	• X-Ray (retrograde or antegrade urethrography) • MRI • Ultrasound	evaluate congenital abnormalities, fistula, diverticula, (post-surgical) stricture, neoplasm
Ano-rectum	• Endoanal ultrasound (10-13-16 Hz axial and sagittal array) • Defecography • MRI	Anal sphincter integrity; peri-anal sepsis, pelvic floor coordination during defecation
Penis	• Ultrasound • CT • MRI	Peyronie's disease, corpora cavernosa rupture.
Lower urinary tract	• Video-cystourethrography • Video-urodynamic	Evaluate of the bladder during filling and/or voiding, vesico-ureteric reflux; bladder morphology – trabeculation, diverticulum; anatomical site; BOO; type of stress incontinence; urethral diverticulum; strictures, fistulae

3.2.2) ultrasound measurement of the bladder volume. The following formula shows the lowest transabdominal measurement error when compared with catheterization.[99] PVR calculation (by abdominal ultrasound) is done by multiplying the width (left to right borders), depth (anterior to posterior borders) and length (cranial to caudal borders) and multiplying this result with 0.52 (there are different multiplication factors available but 0.52 is the most common one) (Figure 13). ***(NEW)***

$$\text{Volume} = (\text{width} \times \text{depth} \times \text{length}[\text{cm}]) \times 0.52[\text{mL}]$$

4.2.3.2 Intercurrent abnormalities: For example, prostate volume (transabdominal, intraabdominal, retroperitoneal, or intrapelvic tumor, hydronephrosis). ***(NEW)***

4.2.3.3 Bladder abnormalities: For example, tumor, foreign body, overdistension, stones. ***(NEW)***

4.2.3.4 Detrusor wall thickness (DWT) or bladder wall thickness (BWT): Transabdominal visualization of the anterior bladder wall with a (linear) high frequency ultrasound scanner for the detection of BOO if DWT is ≥2 mm in bladders filled with ≥250 mL (Figure 14) or BWT is ≥5 mm in bladders filled with 150 mL (Figure 14).[101–105] ***(NEW)***

4.2.3.5 Ultrasound-estimated bladder weight (UEBW): can be calculated

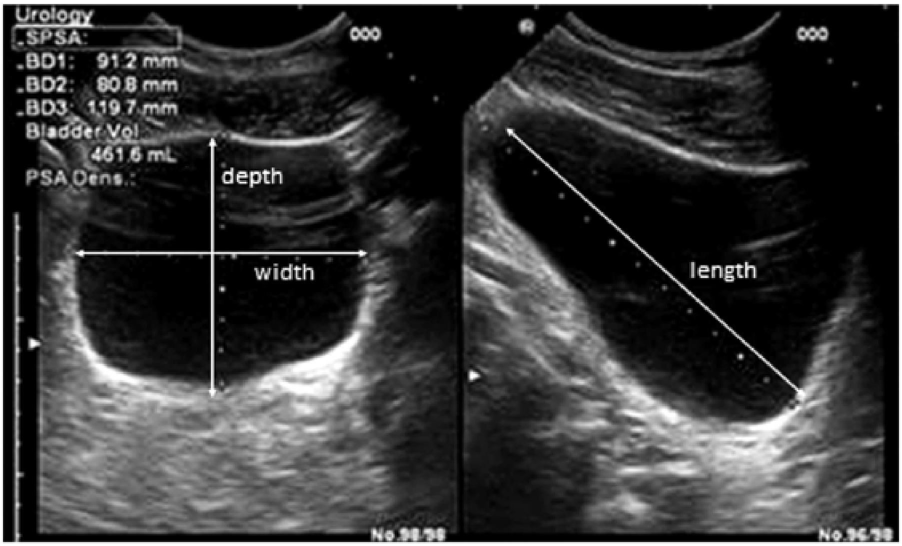

FIGURE 13 Determination of bladder (post-void residual) volume by transabdominal ultrasound imaging

by measuring the urine volume in the bladder and BWT and applying the following formula (Figure 15).[106,107] ***(NEW)***

4.2.3.6 Intravesical Prostatic Protrusion (IPP): Transabdominal measurement of the distance of the bladder base until the tip of the prostate in the bladder lumen[108] (Figure 16A and B). It is recommended to fill the bladder with 100-200 mL of fluid in order to receive representative measurements; bladder filling over 400 mL will lower IPP values.[108] The IPP measurement can be divided into three grades: grade I = 0-4.9 mm; grade II = 5-10 mm; grade III = >10 mm.[109] IPP grade III is associated with prostate-related BOO.

4.2.3.7 Urethral abnormality: For example, diverticulum, urethral stenosis, degree, and depth of spongiofibrosis. ***(NEW)***

4.2.3.8 Postoperative findings*:* For example, post-prostatectomy (urethral shape), male sling position, artificial urinary

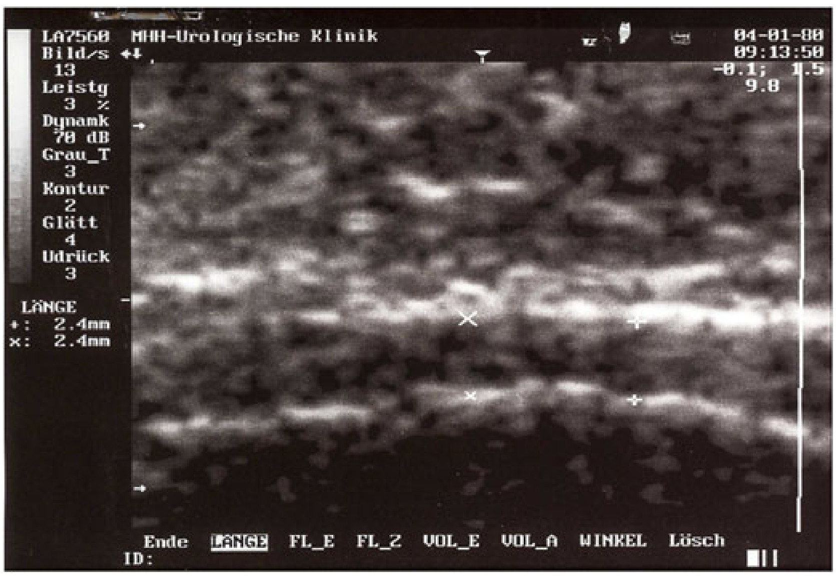

FIGURE 14 Ultrasound measurement of detrusor wall thickness (DWT) at the anterior bladder wall with a linear 7.5 MHz ultrasound array in a bladder filled >250 mL; the hypoechogenic detrusor (black bar) is sandwiched between the hyperechogenic (white) mucosa (bottom) and adventitia (top).[101,102] DWT is measured from the inner border of the mucosa to the inner border of the adventitia as demonstrated in the figure, whereas BWT is measured from the outer border of the mucosa to the outer border of the adventitia

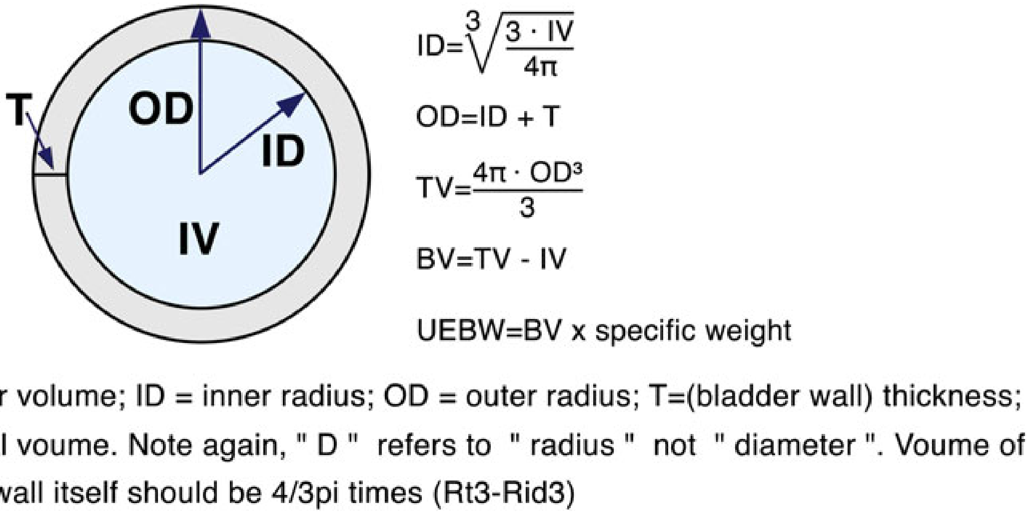

FIGURE 15 UEBW[106,107] **FN 4.1**. IV = inner volume; ID = inner radius; OD = outer radius; T = (bladder wall) thickness; TV = total volume. Note again, "D" refers to "radius" not "diameter". Volume of bladder wall itself should be 4/3pi times (Rt3-Rid3)

sphincter −placement of cuff and reservoir, bulking agents. ***(NEW)***

4.2.3.9 Prostate ultrasound*:* determination of prostate and transition zone volume, prostate shape and visualization of the prostate parenchyma for calcifications, cysts, abscesses, or enlargement (Figure 17). ***(NEW)***

4.2.4 Pelvic floor: For example, anal sphincter defects (see below)

4.2.5 3D and 4D Ultrasound: research modalities at present FN 4.2

4.2.6 Other assessments: Synchronous ultrasound screening of the bladder and/or urethra and measurement of the bladder and abdominal pressure during filling cystometry and pressure flow study (Video-ultrasound-urodynamics). ***(NEW)***

4.2.7 Anal ultrasound (Endosonography[110,111]): This is the gold standard investigation in the assessment of anal sphincter integrity. There is a high incidence of defecatory symptoms in men with anal sphincter defects (Figure 18). ***(NEW)***

4.2.7.1 Endoanal ultrasonography (EAUS) or Anal Endosonography (AES): Ultrasound of the anal canal performed with a pole-like ultrasound probe placed in the anal canal giving a 360 degree image of the anal canal. It is usually performed with the patient placed in the lithotomy, prone position or sometime left lateral. Two dimensional AES; three dimensional AES – three-dimensional reconstruction of the anal canal is performed using either axial or sagittal images. ***(NEW)***

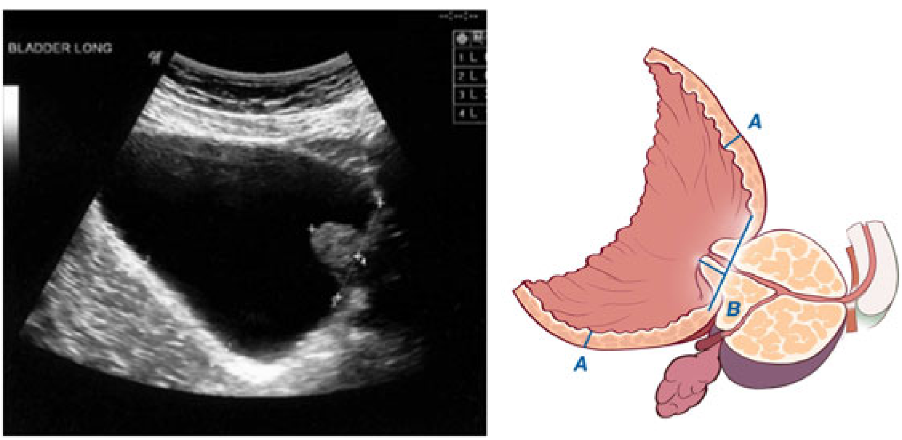

FIGURE 16 A: Transabdominal ultrasound measurement of intravesical prostatic protrusion (IPP). B: How to measure IPP – base of bladder (line A) to the most cranial part of the prostate (line B)

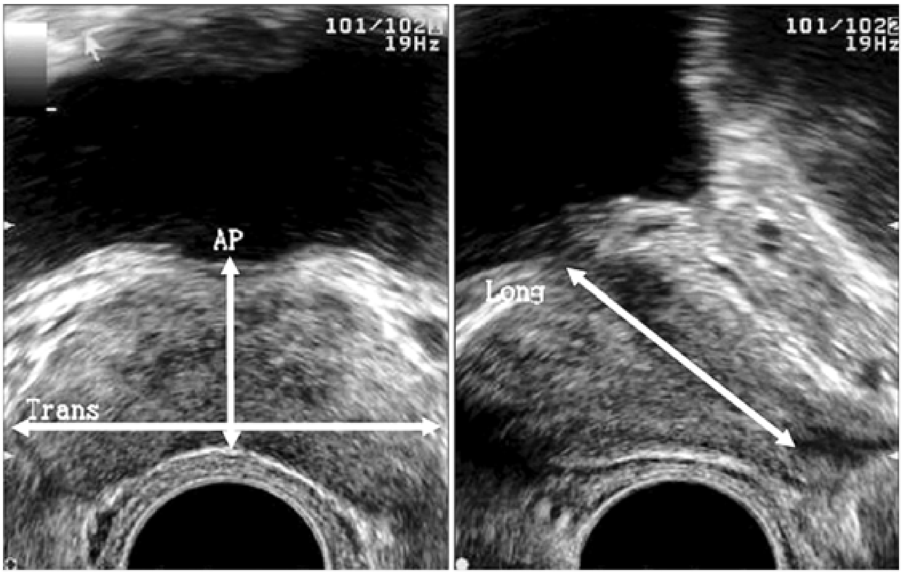

FIGURE 17 Prostatic volume by transrectal ultrasound

4.2.7.2 Anal Canal – The anal canal in adults is between 2.5 and 5 cm in length and begins as the rectum narrows, passing posteriorly between the levator ani. Three levels of assessment in the axial plane.[111] ***(NEW)***

4.2.7.2.1 Upper level: the hyperechoic sling of the puborectalis muscle (PR) and the complete ring of the internal anal sphincter (IAS). ***(NEW)***

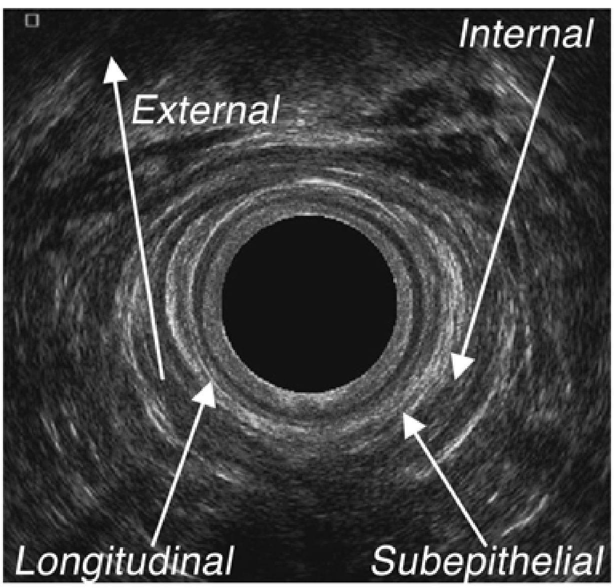

FIGURE 18 Normal anal canal anatomy as seen on anal endosonography (AES)

4.2.7.2.2 Middle level: corresponds to the superficial part of the EAS (concentric band of mixed echogenicity), the conjoined longitudinal layer, the IAS (concentric hypoechoic ring), and the transverse superficial perinei muscles. ***(NEW)***

4.2.7.2.3 Lower level: corresponds to the subcutaneous part of the EAS where the IAS is absent. ***(NEW)***

4.2.7.3 Internal anal sphincter – The caudal continuation of the circular smooth muscle of the rectum forms the internal anal sphincter, which terminates caudally in a clearly defined edge, at a variable distance from the anal verge. ***(NEW)***

4.2.7.4 Longitudinal muscle – Comprises smooth muscle cells continuous with the outer layer of the rectal wall, and striated muscle from various pelvic floor muscles. The longitudinal muscle lies between the internal and external anal sphincters in the inter-sphincteric space. ***(NEW)***

4.2.7.5 External anal Sphincter – It is made up of striated muscle and surrounds the longitudinal muscle forming the outer border of the inter-sphincteric space. The external sphincter is divided into deep, superficial and subcutaneous parts, with the deep and subcutaneous parts of the sphincter forming rings of muscle, between them elliptical fibres from the superficial part of the external anal sphincter run anteriorly from the perineal body to the coccyx posteriorly. ***(NEW)***

4.2.7.6 Puborectalis – is formed from the most anterior fibres of the pubococcygeus muscle, this forms a sling pulling the rectum forward. ***(NEW)***

4.3 Radiography

4.3.1 Modalities in current routine clinical use

4.3.1.1 Intravenous urography (IVU): This provides an anatomical outline of the upper urinary tract, ureters and bladder as well as the evaluation of the kidney function and excretion of contrast media. IVU consists of at least 3–4 abdominal images: one plain x-ray, one almost immediately after injection to evaluate for renal vascular uptake, one image 7 min and one image 15 min after infusion of contrast media (and bladder emptying). The preliminary plain x-ray may show calcification in kidney, ureter, bladder, seminal vesicles or vasa. ***(NEW)***

4.3.1.2 Retrograde urethrocystography and voiding cystourethrography: Unidirectional or combined contrast imaging of the urethra in a patient in the 30 degree oblique position to visualize the lumen, mainly to diagnose urethral strictures or diverticula (Figure 19). It is also of use to diagnose and stage urethral trauma. **(*NEW*)**

4.3.1.3 Voiding cystourethrography: imaging of the bladder neck, urethra and prostate during voiding (Figure 20). The principal use is determining the site of any obstruction, for example, bladder neck or prostate. It can detect vesico-ureteric reflux, vesical or urethral fistulae, vesical or urethral diverticula and strictures. ***(NEW)***

4.3.1.3.1 Videocystourethrography (VCU): Synchronous radiological screening of the bladder and urethra during filling and voiding (Figure 21). The only difference between

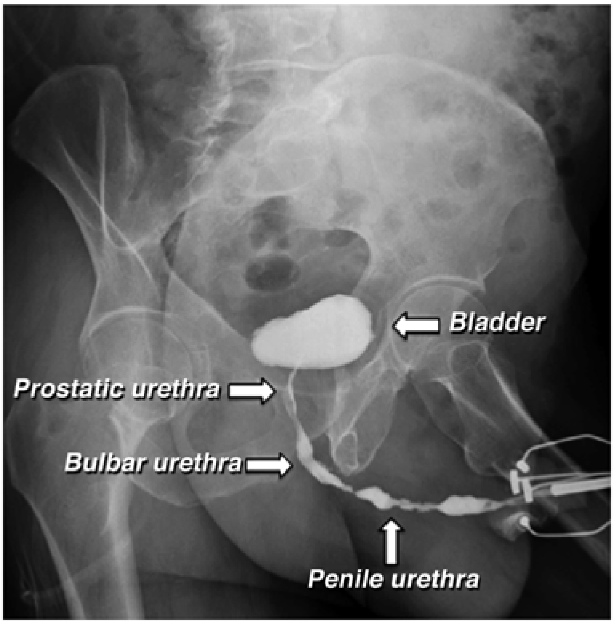

FIGURE 19 Retrograde urethrocystography of a patient with a penile urethral stricture

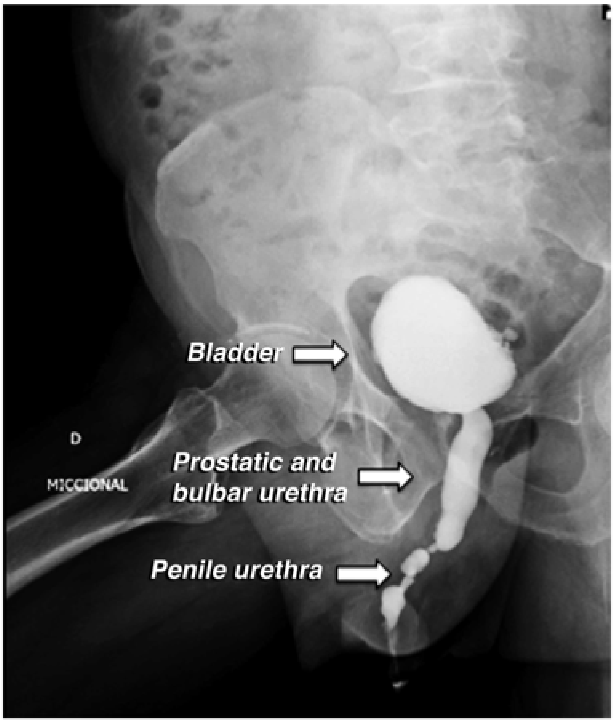

FIGURE 20 Voiding cystourethrography: Shows bladder diverticula, open bladder neck and prostatic urethra till stricture of penile urethra

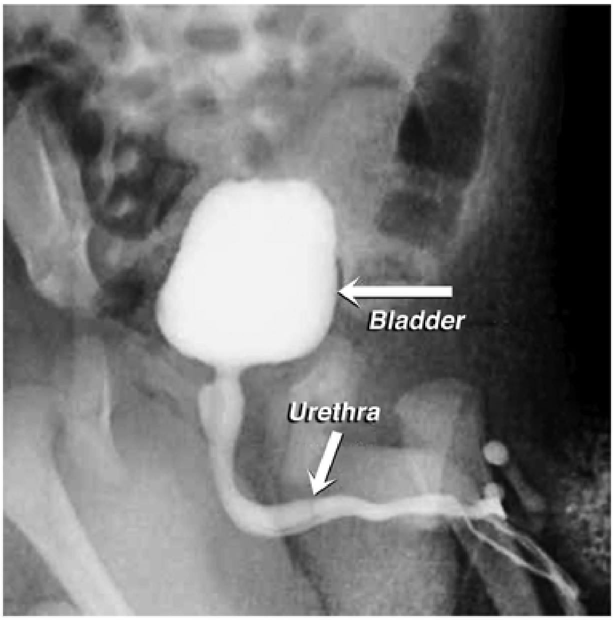

FIGURE 21 Example of Videocystourethrography

VCU and **4.3.1.3.** is continuous image capture. ***(NEW)***

4.3.4 Videourodynamics[112]: Videourodynamics refers to videocystourethrography with synchronous pressure and flow rate recordings. It is a dynamic study with function, during bladder filling and emptying. ***(NEW)*** See also Figure 12.

Video-urodynamics has two defining characteristics:

- It is a kinetic technique that records morphological and functional changes of the lower urinary tract as a function of time. This feature distinguishes this technique from the static images obtained by cystography.
- It is a technique that is applied simultaneously with conventional urodynamic studies.

Image acquisition for the urinary tract can be performed with X-rays (fluoroscopy) or by ultrasound. Although in a strict sense, the "video" prefix refers to the recording of the images and not to their acquisition.

4.3.5 Defecography (Evacuation proctography): This demonstrates the anatomy of the anorectum as well as disorders of rectal evacuation. Barium paste is inserted rectally prior to defecation over a translucent commode. ***(NEW)***

4.4 Computerized Tomography (CT)

4.4.1 CT Urogram (CT-U): CT study of the urinary tract system using injected contrast, used to clarify diagnoses such as (i) tumors; (ii) renal disease; (iii) abnormal fluid collections/abscesses (iv) bladder diseases. ***(NEW)***

4.4.2 CT Kidneys, ureter, bladder (CT-KUB): Non-contrast study aimed primarily at identifying stones but may identify other diseases. Aka "stone protocol." ***(NEW)***

4.5 Magnetic Resonance Imaging[113]

4.5.1 Magnetic resonance imaging (MRI) in male lower urinary tract and pelvic floor dysfunction: MRI provides the opportunity to examine the soft tissue structures of the pelvic support apparatus. It is non-invasive, has excellent soft tissue contrast resolution without exposure to ionizing radiation and allows the study of function of pelvic floor structures under different dynamic conditions. Several anatomical landmarks used for pelvic measurements are also easily identified in MRI and most measurements are thus highly reproducible. T-weighting assists enhancement of fluid-filled structures. ***(NEW)***

4.5.2 Current possible measurements using MRI in male lower urinary tract and pelvic floor dysfunction. $_{\text{FN4.2}}$

4.5.2.1 Bladder abnormalities: For example, tumor, foreign body, bladder wall abnormalities, intestine-vesical fistulae. ***(NEW)***

4.5.2.2 Urethral abnormality: For example, diverticulum, recto-urethral fistulae. ***(NEW)***

4.5.2.3 Urethral sphincter length:[114] prediction of post-prostatectomy incontinence. ***(NEW)***

4.5.2.4 Prostate abnormalities: For example, benign enlargement, cancer, cysts, prostato-rectal fistulae. ***(NEW)***

4.5.2.5 Intercurrent abnormalities: For example, rectum – rectal dynamics are assessed during evacuation after adding ultrasound gel to the rectum. Anorectal and pelvic floor motion can be imaged

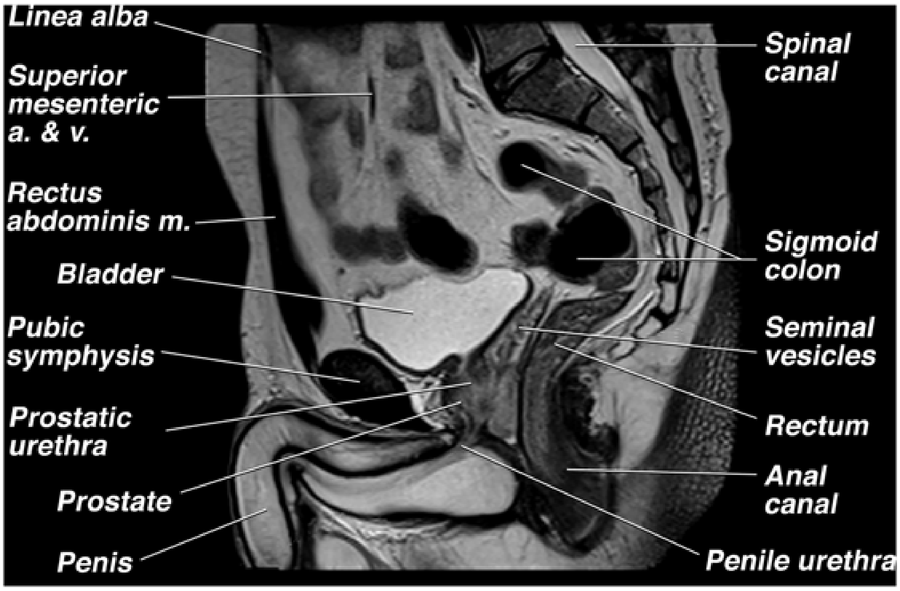

FIGURE 22 MRI (sagittal) of male lower abdomen and pelvis

providing pelvic images at rest and when the subject strains. ***(NEW)***

4.5.2.6 Congenital abnormalities: Detection of Mullerian duct remnants, aberrantly inserted ureters and duplicated pelvic structures. ***(NEW)***

4.5.2.7 Standardised MRI prostate imaging: PI-RADS – prostate imaging reporting and data system (Figures 22–24).$_{FN4.4, FN4.5}$ ***(NEW)***

Footnotes for Section 4

4.1: The "cut-off" value for obstruction has been suggested as 35 g (adult Asian men).[106]

4.2: The potential of 3D and 4D ultrasound in male lower urinary tract and pelvic floor dysfunction is currently being researched with validated applications likely to be included in future updates of this Report and/or separate ultrasound reports.

4.3: Diagnostic ability may be enhanced by the use of 3D MRI. New techniques with high speed sequence of pictures allows for a functional MRI.

4.4: Prostate imaging has over the last 5 years become more standardised with the introduction of PI-RADS (Prostate Imaging Reporting and Data System), currently version 2. The recommended MRI prostate protocol consists of multiparametric study which consists at least of a diffusion sequence (DWI), high resolution anatomical sequences (T2 weighted) and dynamic contrast enhanced sequences (perfusion imaging). A score is given according to each sequence finding and an overall PI-RADS score is finally given based on a structured

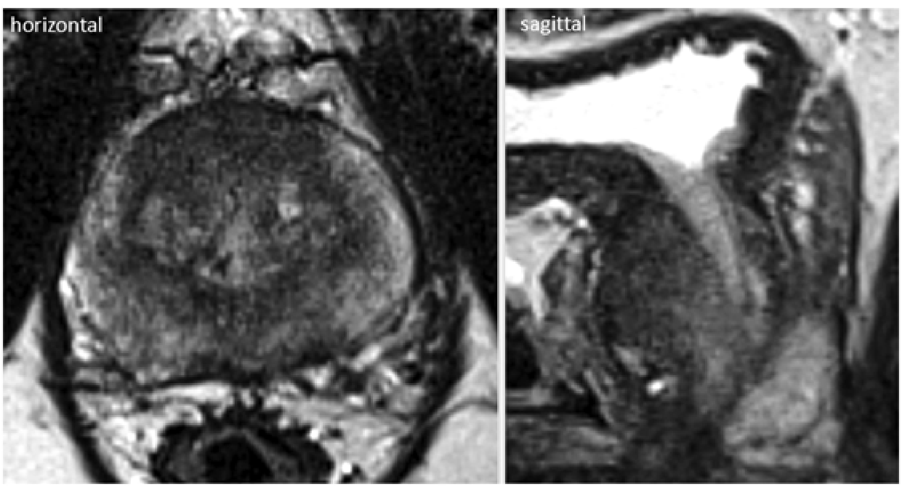

FIGURE 23 MRI of prostate showing low grade inflammatory changes in the peripheral zone

FIGURE 24 MRI of prostate showing prostate cancer in the right posterolateral peripheral zone

reporting scheme. A score of 1–5 is given with one being benign and five being highly suspicious of malignancy. Ideally the MR studies are performed on a three Tesla strength MR scanner negating the need for an endorectal coil to achieve adequate resolution. MR spectroscopy imaging on the prostate is now rarely performed as it rarely adds value to the above multiparametric study.

SECTION 5: DIAGNOSES (MOST COMMON)

This report, like previous ones,[2,3,5] highlights the need to base diagnoses for male lower urinary tract and pelvic floor dysfunction on the correlation between a man's symptoms, signs and any relevant diagnostic investigations. We include EMG and imaging as possible diagnostic investigations. The diagnoses are categorized according to three subgroups that reflect the function of the lower urinary tract, namely storage, voiding dysfunction and mixed storage and voiding dysfunction. *It should be noted that prevalence data for the relative frequency of the different male diagnoses are scarce. FN5.1 More studies are required.* ***(NEW)***

STORAGE DYSFUNCTION (SD) FN5.1 Those diagnoses related to abnormal changes in bladder sensation, detrusor pressure or bladder capacity during filling cystometry. ***(NEW)***

5.1 Bladder Factor

5.1.1 Bladder Oversensitivity (BO)[5] FN5.2 FN 5.3 *(NEW – Male)*

5.1.1.1 Definition: Bladder oversensitivity, a clinical diagnosis made by ***symptoms and urodynamic investigations***, most likely to occur in individuals with symptoms of increased daytime frequency and nocturia. A frequency-volume chart shows a clearly reduced average voided volume (by day and night). As noted in section **(3.4.3.6)**, it can be defined as: increased perceived bladder sensation during bladder filling with specific cystometric findings of: (i) early first desire to void (**3.4.3.2**); (ii) early strong desire to void, which occurs at low bladder volume **(3.4.3.4)**; (iii) low maximum cystometric bladder capacity (**3.4.4.2**); and (iv) no abnormal increases in detrusor pressure. Specific bladder volumes at which these findings occur vary in different populations. FN5.3

5.1.2 Detrusor Overactivity (DO) FN 5.1 FN5.4 FN5.5 FN5.6

5.1.2.1 Definition: As noted in section **3.4.5.2**, this diagnosis by ***symptoms and urodynamic investigations*** is made in individuals with lower urinary tract symptoms (more commonly OAB symptoms – section **1.1.7**) when detrusor muscle contractions occur during filling cystometry. ***(CHANGED)***

5.1.2.2 Subtypes

(i) Idiopathic (primary) detrusor overactivity: As noted in **3.4.5.2.1**, no identifiable cause for the involuntary detrusor contraction(s). ***(CHANGED)***

(ii) Neurogenic (secondary) detrusor overactivity:[3,5,13] As noted in **3.4.5.2.2,** there is detrusor overactivity and evidence (history; visible or measurable deficit) of a relevant neurological disorder. ***(CHANGED)***

(iii) Non-neurogenic (secondary) detrusor overactivity: As noted in **3.4.5.2.3**, an identifiable possible non-neurological cause exists for involuntary detrusor contraction (s) during bladder filling. For example, functional (obstruction); stone, tumor (eg, carcinoma in situ), UTI. ***(CHANGED)***

5.1.3 Reduced compliance storage dysfunction (RCSD): this diagnosis by ***symptoms and urodynamic investigations*** is made in individuals with lower urinary tract symptoms, more commonly storage symptoms, when there is a non-phasic (at times linear or exponential) rise in detrusor pressure during filling cystometry with generally reduced capacity indicating reduced compliance **(section 3.4.6)**. ***(NEW)***

5.1.3.1 Reduced compliance (RCSD) incontinence: urinary incontinence directly related to the RCSD. ***(NEW)***

5.2 Outlet Factor (Urethra/Sphincter Dysfunction – decreased urethral resistance – incompetence /insufficiency)

5.2.1 Urodynamic Stress Incontinence (USI) FN5.7

5.2.1.1 Definition*:* As noted in section **(3.6.2.1)**, this clinical diagnosis by ***symptom, sign and urodynamic investigations*** involves the finding of involuntary leakage during filling cystometry, associated with increased intra-abdominal pressure, in the absence of a detrusor muscle contraction. FN5.7–FN5.10

5.2.1.2 Subtype: Intrinsic sphincter deficiency (ISD (See 3.6.2.1.1): Very weakened urethral closure mechanism. ***(CHANGED)***

VOIDING DYSFUNCTION (VD) Those diagnoses related to abnormally slow and/or incomplete bladder emptying manifest as an abnormally slow urine flow rate **(3.1.10)** and/or an abnormally high post-void residual **(3.2.2)**, with confirmation by pressure-flow studies (including any related imaging). ***(NEW – Male)***

5.3 Bladder factor – (poor or absent detrusor activity)

5.3.1 Detrusor Underactivity (DUA) FN5.11

5.3.1.1 Definition of DU*:* As per **3.7.3.2** A diagnosis based on ***urodynamic investigations*** generally (but not always) with relevant ***symptoms***, ***signs*** manifest by low detrusor pressure or short detrusor contraction in combination with a low urine flow rate **(3.1.10)** resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span, with or without a high postvoid residual **(3.2.2)** (c.f. "hypocontractile detrusor" – detrusor contraction of reduced strength) ***(CHANGED)***

5.3.2 Detrusor Acontractility (DAC) FN5.11

5.3.2.1 Definition of DAC: As per **3.7.3.3**. a diagnosis by ***urodynamic investigation***, generally (but not always) with relevant ***symptoms***, ***signs*** manifest by the absence of an observed detrusor contraction during voiding studies resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span. Voiding in men with DAC is usually achieved by straining or manual pressure on the bladder resulting generally in an abnormally slow urine flow rate **(3.1.10)** and/or an abnormally high postvoid residual **(3.2.2)** ***(CHANGED)***

5.3.2.2 Subtypes:
- Neurogenic detrusor acontractility (See 3.7.3.3.1)
- Non-neurogenic detrusor acontractility (See 3.7.3.3.2)

5.4 Outlet Factor (Urethral/Sphincter dysfunction)

5.4.1 Bladder Outlet Obstruction (BOO) FN 5.1 FN5.12

5.4.1.1 Definition of BOO: A diagnosis based on ***urodynamic investigations (pressure-flow studies ± imaging),*** generally (but not always) with relevant ***symptoms*** and/or ***signs,*** manifest by an abnormally slow urine flow rate (**3.1.10**) FN5.12 with evidence of abnormally high detrusor voiding pressures and abnormally slow urine flow (**3.8.2.1**) during voiding cystometry with or without an abnormally high PVR. (**3.2.2**). FN5.13 ***(CHANGED)***

5.4.1.2 Possible sites/causes of BOO: Can be:

5.4.1.2.1 Functional
bladder neck obstruction, detrusor sphincter dysfunctions, pelvic floor overactivity. ***(NEW)***

5.4.1.2.2 Mechanical: benign prostatic enlargement, urethral stricture, meatal stenosis). **FN5.14-FN5.19**

Imaging of the lower urinary tract especially video-urodynamics and EMG can be required to evaluate location/cause. ***(NEW)***

5.4.2 Alternate presentations of Voiding Dysfunction

5.4.2.1 Acute retention of urine: An individual is unable pass any urine despite having a full bladder, which on examination is painfully distended, and readily palpable and/or percussible. ***(CHANGED)***

5.4.2.2 Chronic retention of urine: Generally (but not always) painless and palpable or percussible bladder, where there is a chronic high PVR. The patient experiences slow flow and chronic incomplete bladder emptying but can be asymptomatic. Overflow incontinence can occur. Some men with retention present with impaired renal function and/or hydronephrosis. ***(CHANGED)***

5.4.2.3 Acute on chronic retention: An individual with chronic retention goes into acute retention and is unable to void. ***(NEW)***

5.4.2.4 Retention with overflow: Involuntary loss of urine directly related to an excessively full bladder in retention. ***(NEW)***

5.5 MIXED STORAGE AND VOIDING DYSFUNCTION

5.5.1 Bladder Outlet Obstruction and Detrusor Underactivity (BOO-DU)

5.5.1.1 Definition: Urodynamic BOO **(3.8.2.1)** occurring synchronous with urodynamic DU **(3.7.3.2)** in pressure-flow analyses. $_{\text{FN5.20}}$ ***(NEW)***

5.5.2 Detrusor Overactivity and Bladder Outlet Obstruction (DO-BOO)$_{\textbf{FN5.1}}$

5.5.2.1 Definition: Urodynamic DO **(3.4.5.2)** on filling cystometry in the presence of BOO **(3.8.2.1)** on pressure-flow studies. $_{\text{FN5.21}}$ ***(NEW)***

5.5.3 Detrusor Overactivity with Detrusor Underactivity (DO-DU)

5.5.3.1 Definition: Urodynamic DO **(3.4.5.2)** on filling cystometry) in combination with urodynamic DU **(3.7.3.2)** on pressure-flow studies. This diagnosis is intended to supersede the old expression "detrusor hyperactivity with impaired contractility" (DHIC) and detrusor overactivity with impaired contractility (DOIC). It is most common in the elderly group. ***(NEW)***

Footnotes for Section 5

5.1: Large series data on the relative frequency of diagnoses in men presenting with symptoms of LUT/PF dysfunction are scarce. The relative prevalence of six main diagnoses is known in women.[4,5] In a series of 504 consecutive men[64] aged 49-94 years, referred for urodynamic studies including videocystourethrography (VCU) and department review of results because of urological symptoms. The following diagnoses were made:

Detrusor overactivity (DO) 149 (29.6%)

DO plus obstruction (BOO) 124 (24.6%)

i.e. Total DO (54.2%)

Obstruction (BOO) alone 161 (31.9%)

i.e. Total Obstruction (56.5%)

Normal/ No Specific Dx 70 (13.9%) Some more recent diagnoses may not have been present in 1990.

5.2: Prevalence of Bladder Oversensitivity (BOS): In the EPIC study,[115] the prevalence rate for men who void with frequencies of greater than eight times per day is approximately 12%. The presence of bladder oversensitivity in urogynaecology patients is 10-13%.[5]

5.3: There should be no known or suspected urinary tract infection. Bladder oversensitivity is often a diagnosis after other more serious conditions such as lower urinary tract malignancy, including carcinoma-in-situ of the bladder, are excluded.

5.4: Prevalence of overall urinary incontinence in men by age:[116] 19-44 (4.8%); 45-64 (11.2%); 65-79 (21.1%); >80 (32.2%)

5.5: Prevalence of urgency (urinary) incontinence in men by age[117]: 19-44 (3.1%); 45-64 (7.8%); 65-79 (11.7%); >80 (18.1%)

5.6: Abnormal detrusor contractions can be, at times, observed during filling cystometry without the patient being symptomatic.

5.7: Prevalence of urodynamic stress incontinence (USI): Prevalence of stress (urinary) incontinence in men by age:[115] 19-44 (0.7%); 45-64 (3.8%); 65-79 (2.7%); >80 (N/A) or overall for men over 18 years[117] (1.4%).

5.8: Men, unlike women, do not develop significant urethral hypermobility (with radical prostatectomy a possible exception), and hence urodynamic stress incontinence is most often associated with intrinsic sphincter deficiency, rather than urethral hypermobility. Sphincter deficiency is most commonly a result of either pelvic trauma or post-prostatectomy, either transurethral or radical, or neurological disorder.

5.9 Prevalence for urinary incontinence after transurethral prostatectomy (TURP) for benign prostatic disease appears between 0.5% and 3%.[118–122]

5.10: Prevalence for post radical prostatectomy: The rates of post radical prostatectomy incontinence varies depending on the definition used and the duration of follow-up. However, the long-term incidence ranges between 4% and 8%.[117–122]

5.11: Prevalence of either detrusor underactivity (DU) or acontractility (DAC): In a study involving a review of urodynamic data of 1179 patients aged 65 and older, Jeong et al. reported the prevalence of DUA of 40.2 % in men.[123]

5.12: Urodynamic BOO can be diagnosed using the ICS Nomogram[89]. The formula used, known as the bladder outlet obstruction index (BOOI) is calculated by detrusor pressure at maximum flow ($P_{det.Qmax}$) minus two times the maximum urinary flow ($BOOI = P_{det.Qmax}$-2 Q_{max}). A BOOI with a value of >40 defines BOO, less than 20 defines absence of BOO, and in between denotes equivocal BOO. Alternative classifications for BOO are the Schäfer grades (0-VI)[90,91] and CHESS classification.[92]

5.13 The evidence in men regarding PVR and BOO is not clear. Urodynamic studies in adult male patients with clinical BPH demonstrated that approx. 30% of men with PVR ≥50 mL do not have BOO/BPO, independent on the magnitude of PVR[124] and, vice versa, 24% of men with urodynamically confirmed BOO/BPO have PVR <50 mL or even 0 mL.[124–125]

5.14: The level of obstruction can usually be diagnosed during voiding video cysto-urethrography. It may be aided by sphincter or pelvic floor EMG during voiding.

5.15: Bladder outlet obstruction from an enlarged prostate: BOO where the cause is benign prostatic enlargement (BPE) with clinical or imaging evidence.

5.16: Bladder outlet obstruction from the bladder neck: BOO where the cause is at the level of the bladder neck (clinical or radiological). The pelvic floor electromyogram (EMG) trace should be quiet during voiding in these patients.

5.17: Bladder outlet obstruction from pelvic floor muscular overactivity*:* Bladder outflow obstruction where the cause is at the level of the pelvic floor musculature (clinical, urodynamic or radiological). The pelvic floor electromyogram (EMG) trace may not be positive during voiding.

5.18: Bladder outlet obstruction from the rhabdosphincter (external urinary sphincter*):* BOO where the cause is at the level of rhabdosphincter (clinical, urodynamic or radiological). The pelvic floor electromyogram (EMG) trace may not be positive during voiding.

5.19: Bladder outlet obstruction from stenosis of bladder neck or urethra due to fibrosis: Bladder neck stenosis may occur secondary to prostate surgery for benign disease, radical prostate surgery, radiotherapy or trauma.

5.20: Currently, although many experts in this field agree that this entity exists, there is currently no consensus on its definition because there is currently no consensus on defining detrusor underactivity. There is a Maastricht-Hannover Nomogram[126] may be used to diagnose reduced detrusor contractility in the presence of obstruction (or vice versa).

5.21: Up to 83%[127] of men with urodynamic BOO may have concomitant urodynamic DO. Both BOO-grade and advancing age were independent factors of DO in men. The more severe BOO, the higher the chance of DO.

AREAS FOR FURTHER RESEARCH

In the preparation of this document, the following "gaps" in knowledge in male LUT/PF dysfunction have been noted compared to the equivalent for female LUT/PF dysfunction:[5]

- Post-void residuals in men with symptoms of LUT/PF dysfunction.
- Male diuresis data.
- Bladder compliance – normal and abnormal values in men.
- Additional large patient series for the prevalence data and the relative frequency of the most common male diagnoses.[64]

ACKNOWLEDGMENTS/ADDENDUM

No discussion on terminology should fail to acknowledge the fine leadership shown by the ICS over many years. The legacy of that work by many dedicated clinicians and scientists is present in all the Reports by the different Standardization Committees and Working Groups. It is pleasing that the ICS leadership has accepted this vital initiative as a means of progress in this important and most basic area of Terminology and its Standardization.

ICS

This document has involved 22 rounds of full review, by co-authors, of an initial draft (BH) with the collation of comments and figures. Included in the review process were as follows: (i) 8 external expert reviewers; (ii) an open ICS website review; (iii) ICS Standardisation Steering Committee review and (iv) ICS Board of Trustees review. The process was subject to live Meetings in Tokyo (Sept 2016 – planning), and Working Group Meetings in Florence (September 2017), Copenhagen (March 2018) and Philadelphia (August 2018). There were also teleconferences in June, July and August 2018. The co-authors acknowledge the input and extensive comments by those external reviewers of version 18: Craig Comiter, Dirk De Ridder, David Ginsberg, John Heesakkers, Michael Kennelly, Richard Millard, Victor Nitti, and Gommert van Koeveringe. Thanks to Dr Pascal Bou-Haidar for his assistance with the MRI section. Version 19 was subject to ICS website publication and an open public forum discussion at ICS Philadelphia. Thanks to those who provided formal, in particular Werner Schäfer, and informal comments. Version 22 was sent for ICS Board review. As there were no significant changes, Version 22 was submitted to Neurourology and Urodynamics in late October 2018 to appear in the Journal in early 2019.

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