Journal of the Association of Chartered Physiotherapists in Women's Health, Spring 2012, **110,** 33–57

SPECIAL CONTRIBUTION

An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction

B. T. Haylen
University of New South Wales, Sydney, New South Wales, Australia

D. de Ridder
University Hospital, Leuven, Belgium

R. M. Freeman
Derriford Hospital, Plymouth, Devon, UK

S. E. Swift
Medical University of South Carolina, Charleston, South Carolina, USA

B. Berghmans
Maastricht University Hospital, Maastricht, Netherlands

J. Lee
Mercy Hospital for Women, Melbourne, Victoria, Australia

A. Monga
Princess Anne Hospital, Southampton, UK

E. Petri
Klinikum Schwerin, Schwerin, Germany

D. E. Rizk
Ain Shams University, Cairo, Egypt

P. K. Sand
Evanston Continence Centre, Evanston, Illinois, USA

G. N. Schaer
Kantonsspital, Aarau, Switzerland

Abstract

Next to existing terminology of the lower urinary tract, because of its increasing complexity, the terminology for pelvic floor dysfunction in women may be better updated by a female-specific approach and clinically based consensus report. This report combines the input of members of the Standardization and Terminology Committees of two International Organizations, the International Urogynecological Association (IUGA) and the International Continence Society (ICS), assisted at intervals by many external referees. Appropriate core clinical categories and a subclassification were developed to give an alphanumeric coding to each definition. An extensive process of 15 rounds of internal and external review was developed to exhaustively examine each definition, with decision-making by

collective opinion (consensus). A terminology report for female pelvic floor dysfunction, encompassing over 250 separate definitions, has been developed. It is clinically based with the six 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 female pelvic floor dysfunction. Female-specific imaging (ultrasound, radiology and magnetic resonance imaging) has been a major addition while appropriate figures have been included to supplement and help clarify the text. Ongoing review is not only anticipated but will be required to keep the document updated and as widely acceptable as possible. A consensus-based terminology report for female pelvic floor dysfunction has been produced aimed at being a significant aid to clinical practice and a stimulus for research.

Keywords: consensus, diagnosis, female pelvic floor dysfunction, symptomatology, terminology, urodynamics.

Introduction

There is currently no single document addressing all elements required for diagnoses in the area of female pelvic floor dysfunction in a comprehensive way. Indeed, the diagnoses themselves 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, signs of a disease; laboratory:'' multiple options mentioned (Stedman 2006). Such a specific report would require a full outline of the terminology for all symptoms, signs, urodynamic investigations for female pelvic floor dysfunction, the imaging associated with those investigations and the most common diagnoses.

It may have been possible in the past to combine all the terminologies for lower urinary tract function in 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 report by the Committee on the Standardization of Terminology (Abrams *et al*. 1988) is one such example. With the increasing specificity and complexity of female diagnoses, a combined report may now be an anachronism. The 2002 report (Abrams *et al*. 2002) still provided the traditional core terminology and some useful modifications, many of which are repeated in this document. However, it also revealed evidence that (1) a coherent and user-friendly combined report may be starting to become too difficult, and (2) the terminology for women, because of the absence of specific diagnoses as well as other female-specific terminology, may not have been advantaged by this approach (Haylen & Chetty 2007). The need for standardized terminology in female pelvic floor dysfunction to enable accurate communication for clinical and research purposes has been highlighted for some time (Weber *et al*. 2001). There is indeed the need for a general terminology, forming a ''backbone'' or ''core'' terminology to which more specific terminologies can be attached.

A female-specific terminology report should be:

(1) As user-friendly as possible: it should be able to be understood by all clinical and research users.
(2) Clinically based: symptoms, signs and validated investigations should be presented for use in forming workable diagnoses. The sections ''Symptoms'', ''Signs'' and ''Urodynamic investigations and associated pelvic imaging'' will address symptoms, signs, and urodynamic investigations and current associated pelvic imaging modalities routinely used in the office or urodynamic laboratory to make those diagnoses. A number of related radiological investigations as well as magnetic resonance imaging (MRI) have also been included. The detailed description of electromyography and related nerve conduction, reflex latency and other sensory studies contained in references (Abrams *et al*. 1988) will again (Abrams *et al*. 2002) not be reinstated here. This report does not specifically address terminology for neurogenic pelvic floor dysfunction.

The section ''Diagnoses (most common)'' will address the most common diagnoses of pelvic

Correspondence: B. T. Haylen, St Vincent's Clinic, Suite 904, 438 Victoria Street, Darlinghurst, Sydney, 2010, NSW, Australia (e-mail: haylen@optusnet.com.au).

floor dysfunction. The terms (Abrams *et al.* 2002) ''urodynamic observation'' and ''condition'' (non-medical) have not been used in this report. The scope of the report will exclude (1) more invasive investigations requiring an anaesthetic and (2) evidence-based treatments for each diagnosis.

(3) Able to indicate origin and to provide explanations: where a term's existing definition (from one of multiple sources used) is deemed appropriate, that definition will be included and duly referenced. A large number of terms in female pelvic floor function and dysfunction, because of their long-term use, have now become generic, as apparent by their listing in medical dictionaries.

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.[1,2,3] Wherever possible, evidence-based medical principles will be followed.

As in earlier ICS Reports (Abrams *et al.* 1988, 2002), 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 urinae is being discussed, then the correct term is detrusor.

It is suggested that acknowledgement of these standards in written publications related to female pelvic floor 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 jointly recommended by the International Continence Society and the International Urogynecological Association, except where specifically noted.''

Symptoms

Symptom: Any morbid phenomenon or departure from the normal in structure, function or sensation experienced by the woman, and indicative of disease (Stedman 2006) or a health problem. Symptoms are either volunteered by or elicited from the individual, or may be described by the individual's caregiver (Abrams *et al.* 1988, 2002).

Urinary incontinence symptoms (see footnote 1)

(i) Urinary incontinence (symptom): complaint of involuntary loss of urine.
(ii) Stress (urinary) incontinence: complaint of involuntary loss of urine on effort or physical exertion (e.g. sporting activities), or on sneezing or coughing. N.B. ''activity-related incontinence'' might be preferred in some languages to avoid confusion with psychological stress.
(iii) Urgency (urinary) incontinence: complaint of involuntary loss of urine associated with urgency (see footnote 2).
(iv) Postural (urinary) incontinence: (NEW) complaint of involuntary loss of urine associated with change of body position; for example, rising from a seated or lying position (see footnote 3).
(v) Nocturnal enuresis: complaint of involuntary urinary loss of urine that occurs during sleep (Abrams *et al.* 2002).
(vi) Mixed (urinary) incontinence: complaint of involuntary loss of urine associated with urgency and also with effort or physical exertion, or on sneezing or coughing.
(vii) Continuous (urinary) incontinence: complaint of continuous involuntary loss of urine (Blaivas *et al.* 1997; Abrams *et al.* 2002).
(viii) Insensible (urinary) incontinence: (NEW) complaint of urinary incontinence where the woman has been unaware of how it occurred.
(ix) Coital incontinence: (NEW) complaint of involuntary loss of urine with coitus. This symptom might be further divided into that occurring with penetration and that occurring at orgasm.

Bladder storage symptoms

(i) Increased daytime urinary frequency: complaint that micturition occurs more frequently during waking hours than previously deemed normal by the woman.[4]
(ii) Nocturia: complaint of interruption of sleep one or more times because of the need to

[1]''Continence'' is defined as voluntary control of bladder and bowel function.

[2]''Urgency'' replaces ''urge'' as the ''accepted'' terminology for the abnormal rather than the normal phenomenon.

[3]This is a common symptom, the mechanism of which has not been adequately researched. It is uncertain whether it should be linked to stress urinary incontinence or urgency urinary incontinence.

[4]Traditionally, seven episodes of micturition during waking hours has been deemed as the upper limit of normal, although it may be higher in some populations (Fitzgerald 2003).

micturate (Abrams *et al*. 2002).[5] Each void is preceded and followed by sleep.

(iii) Urgency: complaint of a sudden, compelling desire to pass urine which is difficult to defer.[6]

(iv) Overactive bladder (OAB, urgency) syndrome: urinary urgency, usually accompanied by frequency and nocturia, with or without urgency urinary incontinence, in the absence of urinary tract infection or other obvious pathology.

Sensory symptoms

Sensory symptoms: A departure from normal sensation or function, experienced by the woman during bladder filling (Stedman 2006). Normally, the individual is aware of increasing sensation with bladder filling up to a strong desire to void (Abrams *et al*. 2002).

(i) Increased bladder sensation: complaint that the desire to void during bladder filling occurs earlier or is more persistent to that previous experienced. N.B. This differs from urgency by the fact that micturition can be postponed despite the desire to void.

(ii) Reduced bladder sensation: complaint that the definite desire to void occurs later to that previously experienced despite an awareness that the bladder is filling.

(iii) Absent bladder sensation: complaint of both the absence of the sensation of bladder filling and a definite desire to void (Abrams *et al*. 2002).

Voiding and post-micturition symptoms

Voiding symptoms: A departure from normal sensation or function, experienced by the woman during or following the act of micturition (Stedman 2006)

(i) Hesitancy: complaint of a delay in initiating micturition.

(ii) Slow stream: complaint of a urinary stream perceived as slower compared to previous performance or in comparison with others.

(iii) Intermittency: complaint of urine flow that stops and starts on one or more occasions during voiding.

(iv) Straining to void: complaint of the need to make an intensive effort (by abdominal straining, Valsalva or suprapubic pressure) to either initiate, maintain or improve the urinary stream.

(v) Spraying (splitting) of urinary stream: complaint that the urine passage is a spray or split rather than a single discrete stream.

(vi) Feeling of incomplete (bladder) emptying: complaint that the bladder does not feel empty after micturition.

(vii) Need to immediately re-void: complaint that further micturition is necessary soon after passing urine.

(viii) Post-micturition leakage: complaint of a further involuntary passage of urine following the completion of micturition.

(ix) Position-dependent micturition: (NEW) complaint of having to take specific positions to be able to micturate spontaneously or to improve bladder emptying; for example, leaning forwards or backwards on the toilet seat, or voiding in the semi-standing position.

(x) Dysuria: complaint of burning or other discomfort during micturition; discomfort may be intrinsic to the lower urinary tract or external (vulvar dysuria).

(xi) (Urinary) retention: (NEW) complaint of the inability to pass urine despite persistent effort.

Pelvic organ prolapse symptoms

Prolapse symptoms: A departure from normal sensation, structure or function, experienced by the woman in reference to the position of her pelvic organs. Symptoms are generally worse at the times when gravity might make the prolapse worse (e.g. after long periods of standing or exercise) and better when gravity is not a factor (e.g. lying supine). Prolapse may be more prominent at times of abdominal straining (e.g. defecation).

(i) Vaginal bulging: complaint of a "bulge" or "something coming down" towards or through the vaginal introitus. The woman may state she can either feel the bulge by direct palpation or see it aided with a mirror.

(ii) Pelvic pressure: complaint of increased heaviness or dragging in the suprapubic area and/or pelvis.

(iii) Bleeding, discharge, infection: complaint of vaginal bleeding, discharge or infection

[5]It is common to void during the night when sleep is disturbed for other reasons (e.g. insomnia, lactation) – this does not constitute nocturia (Cardozo 2000).

[6]The use of the word "sudden", defined as "without warning or abrupt", used in earlier definitions (Abrams *et al*. 1988; Cardozo 2000) has been subject to much debate. Its inclusion has been continued. Grading of "urgency" is being developed.

related to dependent ulceration of the prolapse.

(iv) Splinting/digitation: complaint of the need to digitally replace the prolapse or to otherwise apply manual pressure [e.g. to the vagina or perineum (splinting)], or to the vagina or rectum (digitation) to assist voiding or defecation.

(v) Low backache: complaint of low, sacral (or ''period-like'') backache associated temporally with pelvic organ prolapse (POP).

Symptoms of sexual dysfunction

A departure from normal sensation and/or function experienced by a woman during sexual activity.

(i) Dyspareunia: complaint of persistent or recurrent pain or discomfort associated with attempted or complete vaginal penetration.[7]

(ii) Superficial (introital) dyspareunia: complaint of pain or discomfort on vaginal entry or at the vaginal introitus.

(iii) Deep dyspareunia: complaint of pain or discomfort on deeper penetration (mid- or upper vagina).

(iv) Obstructed intercourse: complaint that vaginal penetration is not possible because of obstruction.

(v) Vaginal laxity: complaint of excessive vaginal laxity.

(vi) Other symptoms (Basson *et al*. 2000; Rogers *et al*. 2001).[8]

Symptoms of anorectal dysfunction[9]

(i) Anal incontinence (symptom): complaint of involuntary loss of faeces or flatus.

(ii) Faecal incontinence: complaint of involuntary loss of faeces (Norton *et al*. 2002):
  (a) solid;
  (b) liquid;
  (c) passive faecal incontinence, such as soiling without sensation or warning, or difficulty wiping clean; and
  (d) coital faecal incontinence: occurring with vaginal intercourse.

(iii) Flatal incontinence: complaint of involuntary loss of flatus (Norton *et al*. 2002).

(iv) Faecal (rectal) urgency: sudden, compelling desire to defecate that is difficult to defer.

(v) Faecal (flatal) urgency incontinence: involuntary loss of faeces (flatus) associated with urgency.

(vi) Straining to defecate: complaint of the need to make an intensive effort (by abdominal straining or Valsalva) to either initiate, maintain or improve defecation.

(vii) Feeling of incomplete (bowel) evacuation: complaint that the rectum does not feel empty after defecation.

(viii) Diminished rectal sensation: complaint of diminished or absent sensation in the rectum (Norton *et al*. 2002).

(ix) 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 II Criteria).[10]

(x) Rectal prolapse: complaint of external protrusion of the rectum.

(xi) Rectal bleeding/mucus: complaint of the loss of blood or mucus per rectum.

Lower urinary tract pain and/or other pelvic pain[11]

(i) Bladder pain: complaint of suprapubic or retropubic pain, pressure or discomfort, related to the bladder, and usually increasing with bladder filling; it may persist or be relieved after voiding (Abrams *et al*. 2002).

(ii) Urethral pain: complaint of pain felt in the urethra and the woman indicates the urethra as the site (Abrams *et al*. 2002).

[7]Dyspareunia, the symptom most applicable to female pelvic floor dysfunction, will depend on many factors, including a woman's introital relaxation and/or pain tolerance, and her partner's hesitancy or insistence.

[8]Other symptoms of female sexual dysfunction, including (1) decreased sexual desire, (2) decreased sexual arousal, (3) decreased orgasm and (4) abstention, are less specific for female pelvic floor dysfunction and will not be defined here. The Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire (PISQ) is a measure of sexual function in women with urinary incontinence or pelvic organ prolapse (Rogers *et al*. 2001).

[9]Symptoms of defecatory dysfunction are commonly associated with POP, particularly posterior vaginal prolapse.

[10]Rome II Criteria for Constipation: complaint that bowel movements are infrequent (<3 week^{-1}) and there is a need to strain, lumpy or hard stool, bloating, sensation of incomplete evacuation, sensation of anorectal obstruction or blockage, abdominal pain, and need for manual assistance in more than one-quarter of all defecations.

[11]The definitions of pelvic pain and especially chronic pelvic pain are being debated by several societies with a view to simplification and restructuring of the classification. The chronic (present for at least 3 months) pain syndromes will not be included till consensus is reached.

(iii) Vulval pain: complaint of pain felt in and around the vulva (Abrams *et al*. 2002).
(iv) Vaginal pain: complaint of pain felt internally within the vagina, above the introitus (Abrams *et al*. 2002).
(v) Perineal pain: complaint of pain felt between the posterior fourchette (posterior lip of the introitus) and the anus (Abrams *et al*. 2002).
(vi) Pelvic pain: the complaint of pain perceived to arise in the pelvis, not associated with symptoms suggestive of lower urinary tract, sexual, bowel or gynaecological dysfunction; it is less well-defined than the above types of localized pain.
(vii) Cyclical (menstrual) pelvic pain: cyclical pelvic pain related to menses that raises the possibility of a gynaecological cause.
(viii) Pudendal neuralgia: burning vaginal or vulval (anywhere between anus and clitoris) pain associated with tenderness over the course of the pudendal nerves; recently, five essential criteria (Nantes criteria) have been proposed for the diagnosis of pudendal neuropathy (Labat *et al*. 2008):
  (a) pain in the anatomical region of pudendal innervation;
  (b) pain that is worse with sitting;
  (c) no waking at night with pain;
  (d) no sensory deficit on examination; and
  (e) relief of symptoms with a pudendal block.
(ix) Chronic lower urinary tract and/or other pelvic pain syndromes (see footnote 11).

Lower urinary tract infection

(i) Urinary tract infection (UTI): scientific diagnosis of a UTI is the finding of microbiological evidence of significant bacteriuria and pyuria,[12] usually accompanied by symptoms such as increased bladder sensation, urgency, frequency, dysuria, urgency urinary incontinence and/or pain in the lower urinary tract.
(ii) Recurrent urinary tract infections (UTIs): at least three symptomatic and medically diagnosed UTI in the previous 12 months;[13] the previous UTI(s) should have resolved prior to a further UTI being diagnosed.
(iii) Other related history (e.g. haematuria and catheterization).

Signs

Sign: Any abnormality indicative of disease or a health problem, discoverable on examination of the patient; an objective indication of disease (Stedman 2006); or a health problem.

Urinary incontinence signs

All examinations for urinary incontinence are best performed with the woman's bladder comfortably full.

(i) Urinary incontinence: observation of involuntary loss of urine on examination: this may be urethral or extra-urethral (Abrams *et al*. 2002).
(ii) Stress (urinary) incontinence (clinical stress leakage): observation of involuntary leakage from the urethra synchronous with effort or physical exertion, or on sneezing or coughing (Abrams *et al*. 2002).
(iii) Urgency (urinary) incontinence: observation of involuntary leakage from the urethra synchronous with the sensation of a sudden, compelling desire to void that is difficult to defer.
(iv) Extra-urethral incontinence: observation of urine leakage through channels other than the urethral meatus (e.g. fistula).
(v) Stress incontinence on prolapse reduction (occult or latent stress incontinence): (NEW) stress incontinence only observed after the reduction of co-existent prolapse.[14]

Signs of pelvic organ prolapse

All examinations for POP should be performed with the woman's bladder empty (and if possible, an empty rectum). An increasing bladder volume has been shown to restrict the degree of descent of the prolapse (Yang *et al*. 1993). The

[12]Commonly suggested criteria are: (1) bacteriuria, >100 000 colony-forming units (CFUs) mL^{-1} on voided specimen or >1000 CFUs mL^{-1} on catheterized specimen; and (2) pyuria, >10 white blood cells mm^{-3}.

[13]Recurrent urinary tract infections (UTIs) has not been consistently defined. 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 three medically diagnosed UTIs over the previous 12 months. "Recur" strictly means to "occur again" or "be repeated". This would imply a minimum of (1) two or more, or (2) three or more of the more commonly accepted UTIs in the previous 12 months.

[14]Stress incontinence on prolapse reduction is a sign frequently alluded to, but not properly defined to date. The means of reducing the prolapse will vary. A pessary or ring might, at times, obstruct the urethra, giving a false negative for this sign.

choice of the woman's position during examination [e.g. left lateral (Sims), supine, standing or lithotomy] is that which can best demonstrate POP in that patient and which the woman can confirm (e.g. by use of a mirror or digital palpation). The degree of prolapse may be worse later in the day (after a lengthy time in the erect position) than it is earlier in the day. The hymen remains the fixed point of reference for prolapse description (Bump *et al.* 1996).

(i) Pelvic organ prolapse (definition): The descent of one or more of the anterior vaginal wall, posterior vaginal wall, the uterus (cervix) or the apex of the vagina (vaginal vault or cuff scar after hysterectomy). The presence of any such sign should be correlated with relevant POP symptoms. More commonly, this correlation would occur at the level of the hymen or beyond.

(ii) Pelvic organ prolapse (staging) (Fig. 1) (Bump *et al.* 1996; Abrams *et al.* 2002):
   - (Stage 0) No prolapse is demonstrated.
   - (Stage I) Most distal portion of the prolapse is more than 1 cm above the level of the hymen.
   - (Stage II) Most distal portion of the prolapse is 1 cm or less proximal to or distal to the plane of the hymen.
   - (Stage III) The most distal portion of the prolapse is more than 1 cm below the plane of the hymen.
   - (Stage IV) Complete eversion of the total length of the lower genital tract is demonstrated.[15]

(iii) Uterine/cervical prolapse: observation of descent of the uterus or uterine cervix.

(iv) Vaginal vault (cuff scar) prolapse: observation of descent of the vaginal vault (cuff scar after hysterectomy) (Ricci 1945).[16]

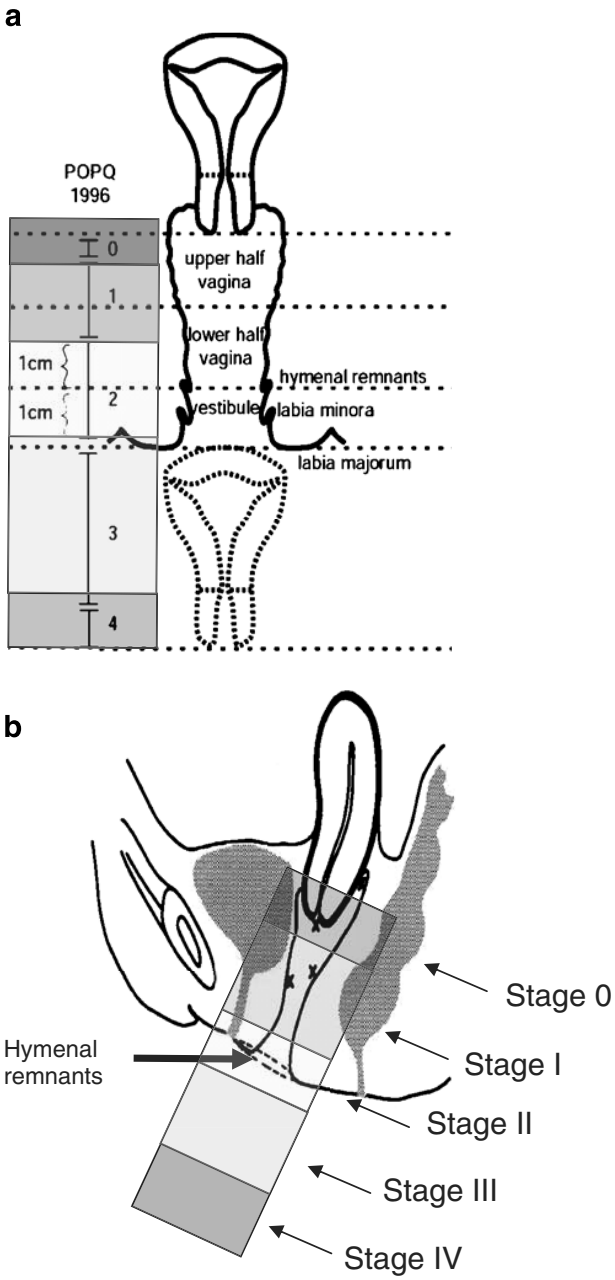

Figure 1. (a) and (b) show prolapse staging – 0, I, II, III and IV (uterine – by the position of the leading edge of the cervix).

(v) Anterior vaginal wall prolapse: observation of descent of the anterior vaginal wall. Most commonly, this would be caused by bladder prolapse (cystocele, either central, paravaginal or a combination). Higher-stage anterior vaginal wall prolapse will generally involve uterine or vaginal vault (if uterus is absent) descent. Occasionally,

[15]The ICS POP quantification system that describes the topographic position of six vaginal sites is the subject of a review by the IUGA Standardization and Terminology Committee with a view to simplification. These sites and the methodology behind the measurement format (Bump *et al.* 1996) have, therefore, not been included here. Consensus was not reached on inserting a valuation of the different prolapse stages into the report, although it will be subject to ongoing discussion (e.g. considering Stage 0 or 1 as different degrees of normal support). Considering Stage 2 or more, where the leading edge is at or beyond the hymen, this is definite prolapse (Swift *et al.* 2003, 2005).

[16]Most gynaecologists are generally comfortable with the terms cystocele, rectocele, vaginal vault prolapse and enterocele. Coupled with the brevity of these terms and their clinical usage for up to 200 years (Ricci 1945), the inclusion of these terms is appropriate. Some regard it as important to surgical strategy to differentiate between a *central cystocele* (a central defect with loss of rugae caused by stretching of the subvesical connective tissue and the vaginal wall) and a *paravaginal defect* (rugae preserved because of detachment from the arcus tendineus fasciae pelvis).

there might be anterior enterocele (hernia of peritoneum and possibly abdominal contents) formation after prior reconstructive surgery (Ricci 1945) (see footnote 16).

(vi) Posterior vaginal wall prolapse: observation of descent of the posterior vaginal wall. Most commonly, this would be caused by rectal protrusion into the vagina (rectocele). Higher-stage posterior vaginal wall prolapse after prior hysterectomy will generally involve some vaginal vault (cuff scar) descent and possible enterocele formation (Ricci 1945) (see footnote 16). Enterocele formation can also occur in the presence of an intact uterus.

Other pelvic examinations/signs (Abrams et al*. 1988, 2002; Messelink* et al*. 2005)*

The internal examinations are generally best performed with the woman's bladder empty.

(i) Vulval examination: abnormalities include cysts, other tumours, atrophic changes or lichen sclerosis.

(ii) Urethral inspection/palpation:
  (a) Urethral mucosal prolapse: prolapse, generally circumferential and larger, of the distal urethral urothelium.
  (b) Urethral caruncle: smaller eversion of the urethral urothelium, generally involving the posterior lip.
  (c) Urethral diverticulum: the presence of a sac opening from the urethra. It might be suspected by a lump or tenderness along the line of the urethra or external urethral discharge on urethral massage.

(iii) Vaginal examination: examination for vaginal length and mobility, presence of scarring and/or pain, and estrogenization. The location of any vaginal pain should be noted. Included here is any tenderness over the course of the pudendal nerve (see ''Lower urinary tract pain and/or other pelvic pain'', ''Pudendal neuralgia'').

(iv) Bimanual pelvic examination: observations for any pelvic mass or unusual tenderness by vaginal examination together with suprapubic palpation.

(v) Pelvic floor muscle (PFM) function (Abrams *et al*. 2002; Messelink *et al*. 2005): can be qualitatively defined by the tone at rest and the strength of a voluntary or reflex contraction as strong, normal, weak or absent, or by a validated grading symptom. Voluntary PFM contraction and relaxation may be assessed by visual inspection, by digital palpation (circumferentially), electromyography, dynamometry, perineometry or ultrasound. Factors to be assessed include muscle strength (static and dynamic), voluntary muscle relaxation (absent, partial, complete), muscular endurance (ability to sustain maximal or near-maximal force), repeatability (the number of times a contraction to maximal or near-maximal force can be performed), duration, coordination and displacement. It is desirable to document findings for each side of the pelvic floor separately to allow for any unilateral defects and asymmetry. The ICS report on the standardization of terminology of PFM function and dysfunction (Messelink *et al*. 2005) provides a fuller description of the assessment of PFM function including the following:
  (a) Normal PFMs: PFMs which can voluntarily and involuntarily contract and relax.
  (b) Overactive PFMs: PFMs which do not relax or may even contract when relaxation is functionally needed; for example, during micturition or defecation.
  (c) Underactive PFMs: PFMs which cannot voluntarily contract when this is appropriate.
  (d) Non-functioning PFMs: PFMs where there is no action palpable.

(vi) Examination for levator (puborectalis) injury: the puborectalis muscle may be assessed for the presence of major morphological abnormalities by palpating its insertion on the inferior aspect of the os pubis. If the muscle is absent 2–3 cm lateral to the urethra, i.e. if the bony surface of the os pubis can be palpated as devoid of muscle, an ''avulsion injury'' of the puborectalis muscle is likely (Dietz & Shek 2008).

(vii) Perineal examination (Messelink *et al*. 2005): when the patient is asked to cough or Valsalva, the perineum should show no downward movement; ventral movement may occur because of the guarding actions of the PFMs:
  (a) Perineal elevation: this is the inward (cephalad) movement of the vulva, perineum and anus.
  (b) Perineal descent: this is the outward (caudal) movement of the vulva, perineum and anus.

(viii) Rectal examination: observations can include:
  (a) Anal sphincter tone and strength: assessment on digital examination as good or poor in the absence of any quantitative assessment.
  (b) Anal sphincter tear: may be recognized as a clear ''gap'' in the anal sphincter on digital examination.
  (c) Confirm presence or absence of rectocele: and if possible, differentiate from enterocele; diagnose perineal body deficiency.
  (d) Confirm presence or absence of faecal impaction.
  (e) Other rectal lesions: intussusception, rectovaginal fistula or tumour.
  (f) Anal lesions: haemorrhoids, fissure.
  (g) Other peri-anal lesions: anocutaneous fistula.

Other relevant examinations/signs (Abrams et al*. 2002)*

The following general examinations and signs may be relevant:

(i) Neurological signs: for patients with possible neurogenic lower urinary tract or pelvic floor dysfunction, there should be particular note of those neurological signs related to S2–S4, but these should be complemented by a more general neurological examination as indicated.
(ii) Abdominal signs: among numerous possible abdominal signs are:
  (a) Bladder fullness/retention: the bladder may be felt by abdominal palpation or suprapubic percussion.
  (b) Other abdominal masses: or distension (e.g. ascites).
  (c) Scars: indicating previous relevant surgery or traumas.
  (d) Renal area: examination for tenderness, masses.

Frequency-volume chart/bladder diary

(i) Frequency-volume chart (FVC): the recording of the time of each micturition and the volume voided for at least 24 h. Two or three days of recording (not necessarily consecutive) will generally provide more useful clinical data. Information obtained will confirm:
  (a) Daytime urinary frequency: number of voids by day (wakeful hours including last void before sleep, and first void after waking and rising).
  (b) Nocturnal frequency/nocturia: number of times sleep is interrupted by the need to micturate. Each void is preceded and followed by sleep.
  (c) Twenty-four-hour frequency: Total number of daytime voids and episodes of nocturia during a specified 24-h period.
  (d) Twenty-four-hour urine production: summation of all urine volumes voided in 24 h.
  (e) Maximum voided volume: highest voided volume recorded.
  (f) Average voided volume: summation of volumes voided divided by the number of voids
  (g) Median functional bladder capacity: median maximum voided volume in everyday activities.
  (h) Polyuria: excessive excretion of urine resulting in profuse and frequent micturition (Abrams *et al.* 2002). It has been defined as over 40 mL kg^{-1} body weight during 24 h or 2.8 L urine for a woman weighing 70 kg (Van Kerrebroeck *et al.* 2002).
  (i) Nocturnal urine volume: cumulative urine volume from voids after going to bed with the intention of sleeping to include the first void at the time of waking with the intention of rising (excludes last void before sleep).
  (j) Nocturnal polyuria: excess (over 20–30% – age-dependent) proportion of urine excretion (nocturnal voided volume/total 24 h voided volume × 100%) occurs at night (or when patient is sleeping).[17]
(ii) Bladder diary: adds to the FVC above, the fluid intake, pad usage, incontinence episodes and the degree of incontinence (Fig. 2). 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.

Pad testing

Quantification of the amount of urine lost over the duration of testing by measuring the increase in the weight of the perineal pads (weighed pre-

[17]More than 20% (young adults) to 33% (over 65 years) has been suggested as excessive (Abrams *et al.* 2002).

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.

· Please fill in approximately when and how much fluid you drink, and the type of liquid.

· Please fill in the time and the amount (in mls, or ounces) of urine passed, and mark with a star if you have leaked or mark with a "P" if you have needed to change your pad.

(Please find below an example of how to complete this form.)

DATE/TIME DD.MM.YY	LIQUID INTAKE (ml)	VOLUME OF URINE (ml)	LEAKS	PAD CHANGE
21 .02.06			☆	
0215		150		
0715		250		
0800	Mug coffee 250ml			
0820		60	☆	P
0930	Cup orange juice		☆	
1000		100		
1200	2 mugs coffee			
1400		300		
1430		20		
1530	Cup of tea 200ml		☆	P
1600		100	☆	
1800	Cup of tea 200ml			
1900		100		
2000	Glass beer 200ml	20		
2030	Glass wine 50ml		☆	
2200				P
2300		150		

SUMMARY

Frequency = 9; Nocturia = 1; Urine production / 24hr = 1250ml;
Maximum voided volume = 300ml; Average voided volume = 125ml.

Figure 2. Example of a bladder diary.

and post-testing) used. This may give a guide to the severity of incontinence. Different durations from a short (1-h) test to 24- and 48-h tests have been used with provocation varying from normal everyday activities to defined regimens.

Urodynamic investigations and associated pelvic imaging

Urodynamics: Functional study of the lower urinary tract.

Clinical sequence of testing: Urodynamic investigations generally involve a woman attending with a comfortably full bladder for free (no catheter) uroflowmetry and post-void residual urine volume (PVR) measurement prior to filling and voiding (with catheter) cystometry.

Uroflowmetry

(i) Ideal conditions for free (or spontaneous – no catheter) uroflowmetry: ideally, all free

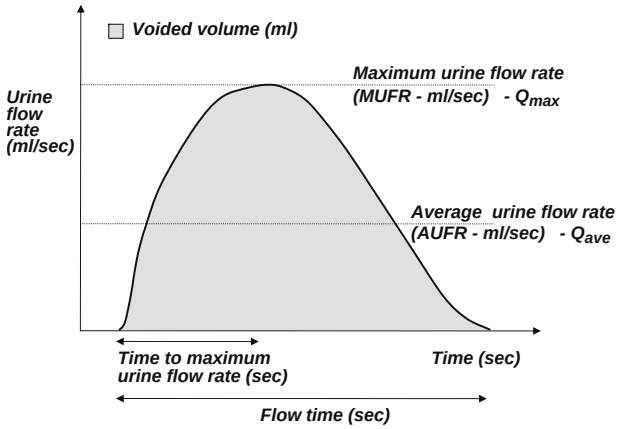

Figure 3. A schematic representation of urine flow over time.

uroflowmetry studies should be performed in a completely private uroflowmetry room. Most modern uroflowmeters have a high degree of accuracy ($\pm 5\%$) though regular calibration is important (Haylen *et al*. 2008b).

(ii) Urine flow: voluntary urethral passage of urine, which may be:
  (a) Continuous: no interruption to flow.
  (b) Intermittent: flow is interrupted.

(iii) Flow rate: volume of urine expelled via the urethra per unit time (Fig. 3). It is expressed in mL s^{-1} (Abrams *et al*. 1988, 2002).

(iv) Voided volume (mL): total volume of urine expelled via the urethra (Abrams *et al*. 1988, 2002).

(v) Maximum (urine) flow rate (MUFR, mL s^{-1}) – Q_{max}: maximum measured value of the flow rate (Abrams *et al*. 1988, 2002) correcting for artefacts (Abrams *et al*. 2002).

(vi) Flow time (s): the time over which measurable flow actually occurs (Abrams *et al*. 1988, 2002).

(vii) Average (urine) flow rate (AUFR, mL s^{-1}) – Q_{ave}: voided volume divided by the flow time (Abrams *et al*. 1988, 2002).

(viii) Voiding time (s): this is the total duration of micturition, i.e. includes interruptions. When voiding is completed without interruption, voiding time is equal to flow time (Abrams *et al*. 1988, 2002).

(ix) Time to maximum flow (s): this is the elapsed time from the onset of urine flow to maximum urine flow (Abrams *et al*. 1988, 2002).

(x) Interpretation of the normality of free uroflowmetry: because of the strong dependency of urine flow rates on voided volume (Fantl *et al*. 1982), these are best referenced to nomograms where the cut-off for abnormally slow (MUFR, AUFR) has been determined and validated (Haylen *et al*. 1989, 1990, 2008b) as under the tenth centile of the respective Liverpool nomogram (Haylen *et al*. 1990) (Fig. 4). References to a specific urine flow rate as the lower limit of normal provided a specific volume has been voided require further validation studies (Costantini *et al*. 2003).

Post-void residual (urine volume)

(i) Post-void residual: volume of urine left in the bladder at the completion of micturition (Abrams *et al*. 2002; Stedman 2006).

(ii) Conditions for PVR measurement: PVR reading is erroneously elevated by delayed measurement because of additional renal input (1–14 mL min^{-1}) into bladder volume (Haylen & Lee 2008). Ultrasonic techniques (transvaginal, abdominal, Doppler planimetry) allow immediate (within 60 s of micturition) measurement (Haylen & Lee 2008). A short plastic female catheter provides the most effective bladder drainage for PVR measurement (Haylen & Lee 2008).

(iii) Assessment of normality of PVR: quoted upper limits of normal may reflect the accuracy of measurement. Studies using "immediate" PVR measurement (e.g. transvaginal ultrasound) suggest an upper limit of normal of 30 mL (Haylen *et al*. 2008a). Studies using urethral catheterization (up to 10 min delay) quote higher upper limits of normal of 50 mL (Costantini *et al*. 2003) or 100 mL (Haylen *et al*. 2008a). An isolated finding of a raised PVR requires confirmation before being considered significant.

Cystometry – general (Abrams et al*. 1988, 2002; Schäfer* et al*. 2002)*

(i) Cystometry: measurement of the pressure–volume relationship of the bladder during filling and/or pressure flow study during voiding (Abrams *et al*. 1988; Schäfer *et al*. 2002).

(ii) Cystometrogram: graphical recording of the bladder pressure(s) and volume(s) over time (Abrams *et al*. 1988; Schäfer *et al*. 2002).

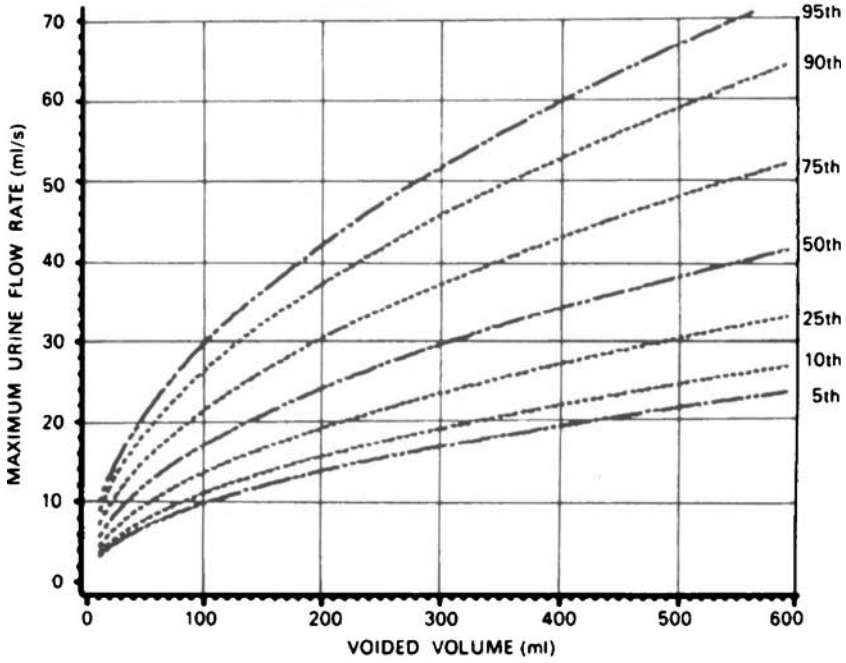

Figure 4. Liverpool nomogram for maximum urine flow rate in women (Haylen *et al.* 1989, 2008b). Equation: L_n (maximum urine flow rate) = 0.511 + 0.505 × L_n (voided volume). Root mean square error = 0.340 (Haylen *et al.* 1989, 2008b); reproduced with permission.

(iii) Urodynamic studies: these usually take place in a special clinical room (urodynamic laboratory) and involve (artificial) bladder filling with a specified liquid at a specified rate (Abrams *et al.* 2002; Schäfer *et al.* 2002).

(iv) Conditions for cystometry (Abrams *et al.* 1988, 2002; Schäfer *et al.* 2002):
  (a) Pressures: all systems are zeroed at atmospheric pressure.
  (b) External pressure transducers: reference point is the superior edge of the pubic symphysis.
  (c) Catheter mounted transducers: reference point is the transducer itself.
  (d) Initial bladder volume: bladder should be empty.
  (e) Fluid medium: usually water or saline (or contrast if radiology is involved).
  (f) Temperature of fluid: should ideally be warmed to body temperature.
  (g) Position of patient: sitting position is more provocative for abnormal detrusor activity than the supine position. At some point in the test, filling might desirably take place with the woman standing.
  (h) Filling rate: the filling rate, including any changes during testing, should be noted on the urodynamic report.

(v) Intravesical pressure (P_{ves}): the pressure within the bladder (Abrams *et al.* 1988, 2002; Stedman 2006).

(vi) Abdominal pressure (P_{abd}): the pressure surrounding the bladder. It is usually estimated from measuring the rectal pressure, though vaginal and, infrequently, the pressure though a bowel stoma can be measured as an alternative. The simultaneous measurement of P_{abd} is essential for interpretation of the P_{ves} trace (Abrams *et al.* 1988, 2002). Artefacts on the detrusor pressure trace may be produced by an intrinsic rectal contraction.

(vii) Detrusor pressure (P_{det}): the component of P_{ves} that is created by forces in the bladder wall (passive and active). It is estimated by subtracting P_{abd} from P_{ves} (Abrams *et al.* 2002).

(viii) Ambulatory urodynamics: these investigations are a functional test of the lower urinary tract, performed outside the clinical setting, involving natural filling and reproducing the woman's everyday activities.

Filling cystometry (Abrams et al. *1988, 2002; Schäfer* et al. *2002)*

(i) Filling cystometry: this is the pressure–volume relationship of the bladder during

bladder filling (Abrams *et al*. 1988; Stedman 2006). It begins with the commencement of filling and ends when a "permission to void" is given by the urodynamicist (Abrams *et al*. 2002).

(ii) Aims of filling cystometry: these are to assess bladder sensation, bladder capacity, detrusor activity and bladder compliance (Abrams *et al*. 1988, 2002).

(iii) Bladder sensation during filling cystometry: this is usually assessed by questioning the woman in relation to the fullness of the bladder during cystometry (Abrams *et al*. 1988):
   (a) First sensation of bladder filling: the feeling when the woman first becomes aware of bladder filling (Abrams *et al*. 2002).
   (b) First desire to void (Abrams *et al*. 1988): the first feeling that the woman may wish to pass urine.
   (c) Normal desire to void: the feeling that leads the woman to pass urine at the next convenient moment, but voiding can be delayed if necessary.
   (d) Strong desire to void: the persistent desire to pass urine without the fear of leakage.
   (e) Urgency: sudden, compelling desire to pass urine which is difficult to defer (Abrams *et al*. 2002) (see footnote 6).
   (f) Bladder oversensitivity – also referred to as either "increased bladder sensation" (Abrams *et al*. 2002) or "sensory urgency" (Abrams *et al*. 1988; now obsolete): increased perceived bladder sensation during bladder filling with: an early first desire to void; an early strong desire to void, which occurs at low bladder volume; a low maximum cystometric bladder capacity ("Filling cystometry", "Maximum cystometric capacity"); no abnormal increases in detrusor pressure.
   (g) Reduced bladder sensation: bladder sensation is perceived to be diminished during filling cystometry.
   (h) Absent bladder sensation: the woman reports no bladder sensation during filling cystometry.
   (i) Pain: the complaint of pain during filling cystometry is abnormal. Its site, character and duration should be noted.

(iv) Bladder capacity during filling cystometry:
   (a) Cystometric capacity: bladder volume at the end of filling cystometry, when "permission to void" is usually given by the urodynamicist. This end-point and the level of the woman's bladder sensation at that time (e.g. "normal desire to void") should be noted.
   (b) Maximum cystometric capacity: in patients with normal sensation, this is the bladder volume when she can no longer delay micturition.

(v) Detrusor function during filling cystometry:
   (a) Normal (previously "stable") detrusor function: there is little or no change in detrusor pressure with filling (Fig. 5). There are no involuntary phasic contractions despite provocation with activities such as postural changes, coughing, hearing the sound of running water and hand-washing.
   (b) Detrusor overactivity: the occurrence of involuntary detrusor contractions during filling cystometry (Fig. 6). These contractions, which may be spontaneous or provoked, produce a waveform on the cystometrogram of variable duration and amplitude. The contractions may be phasic or terminal. Symptoms (e.g. urgency and/or urgency incontinence) may or may not occur. If a relevant neurological cause is present, then *neurogenic detrusor overactivity* is noted, otherwise *idiopathic detrusor overactivity* should be the term used.
   (c) Neurogenic detrusor overactivity: this is where there is detrusor overactivity and there is evidence of a relevant neurological disorder.

(vi) Bladder compliance (Abrams *et al*. 1988, 2002): this describes the relationship between a change in bladder volume and a change in detrusor pressure (Abrams *et al*. 2002). Compliance is calculated by dividing the volume change (ΔV) by the change in detrusor pressure (ΔP_{det}) during that change in bladder volume ($C = \Delta V / \Delta P_{det}$). Compliance is expressed as mL cm^{-1} H_2O. Bladder compliance can be affected by:
   (a) Bladder filling: faster filling is more provocative. An artefact may be produced that settles when filling is interrupted.
   (b) Contractile/relaxant properties of the detrusor (e.g. post-radiation changes of the detrusor wall).
   (c) Starting point for compliance calculations (Abrams *et al*. 2002): usually the detrusor pressure at the start of

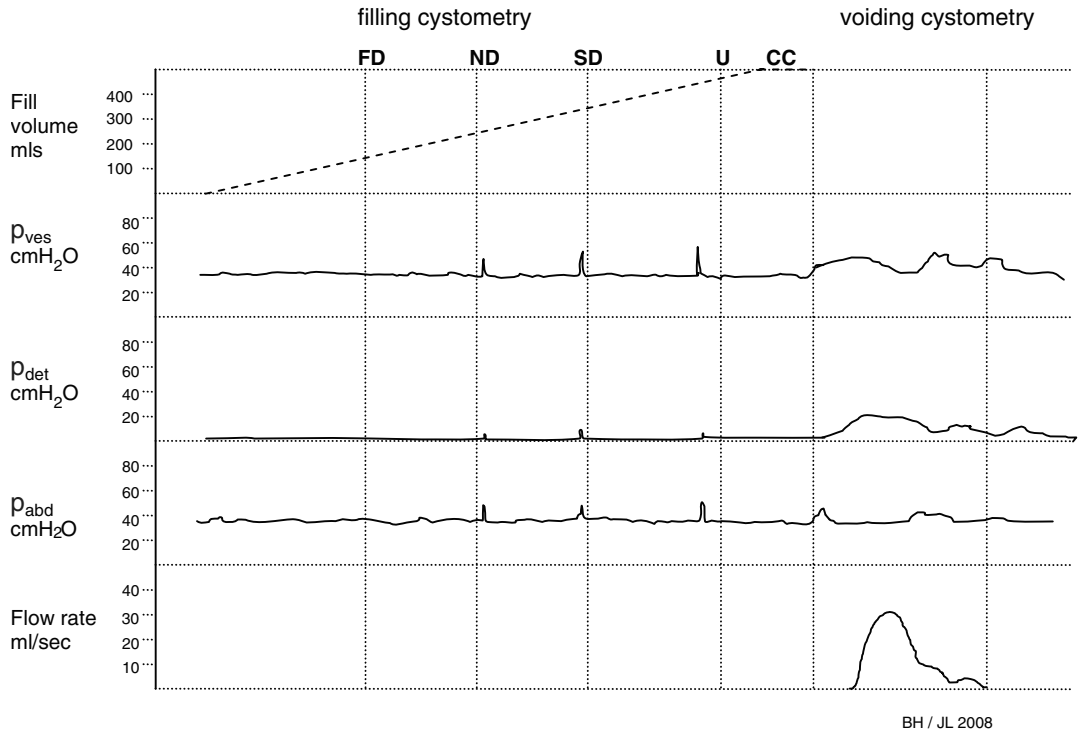

Figure 5. Filling cystometry – normal detrusor function. Forty-eight-year-old female with urinary frequency. No phasic activity during filling. Voided with normal urine flow rate at normal detrusor voiding pressure. Normal study: (FD) first desire to void; (ND) normal desire to void; (SD) strong desire to void; (U) urgency; and (CC) cystometric capacity (permission to void given).

bladder filling and the corresponding bladder volume (usually zero).

(d) End-point for compliance calculations (Abrams *et al*. 2002): the detrusor pressure (and corresponding bladder volume) at cystometric capacity or immediately before the start of any detrusor contraction that causes significant leakage (and therefore, causes the bladder volume to decrease, affecting compliance calculations). Both points are measured excluding any detrusor contraction.

Urethral function during filling cystometry (filling urethrocystometry)

(i) Urethral pressure measurement (Abrams *et al*. 1988, 2002; Schäfer *et al*. 2002): Urethral pressure and urethral closure pressure are idealized concepts that represent the ability of the urethra to prevent leakage. Urethral pressure is currently measured by a number of different techniques that do not tend to have consistent results, either between methods or for a single method (Lose *et al*. 2002). For example, the effect of catheter rotation will be relevant when urethral pressure is measured by a catheter-mounted transducer. Urethral pressure might, nonetheless, be measured:

- at rest, with the bladder at a given volume;
- during coughing or straining; or
- during the process of voiding.

(a) Urethral pressure (intraluminal): this is the fluid pressure needed to just open a closed urethra.

(b) Urethral pressure profile (UPP): this is a graph indicating the intraluminal pressure along the length of the urethra.

(1) Resting UPP: the bladder and subject are at rest.

(2) Stress UPP: defined applied stress (e.g. cough, strain, Valsalva).

All systems are zeroed at atmospheric pressure. For external transducers, the reference point is the superior edge of the symphysis pubis. For catheter-mounted transducers, the reference point is the transducer itself. Intravesical pressure should be measured to exclude a simultaneous detrusor contraction. Methodology should be noted (Abrams *et al*. 1988), including: patient position, catheter type, transducer orientation, fluid and rate of infusion (if fluid-filling system), bladder volume, and rate of catheter withdrawal.

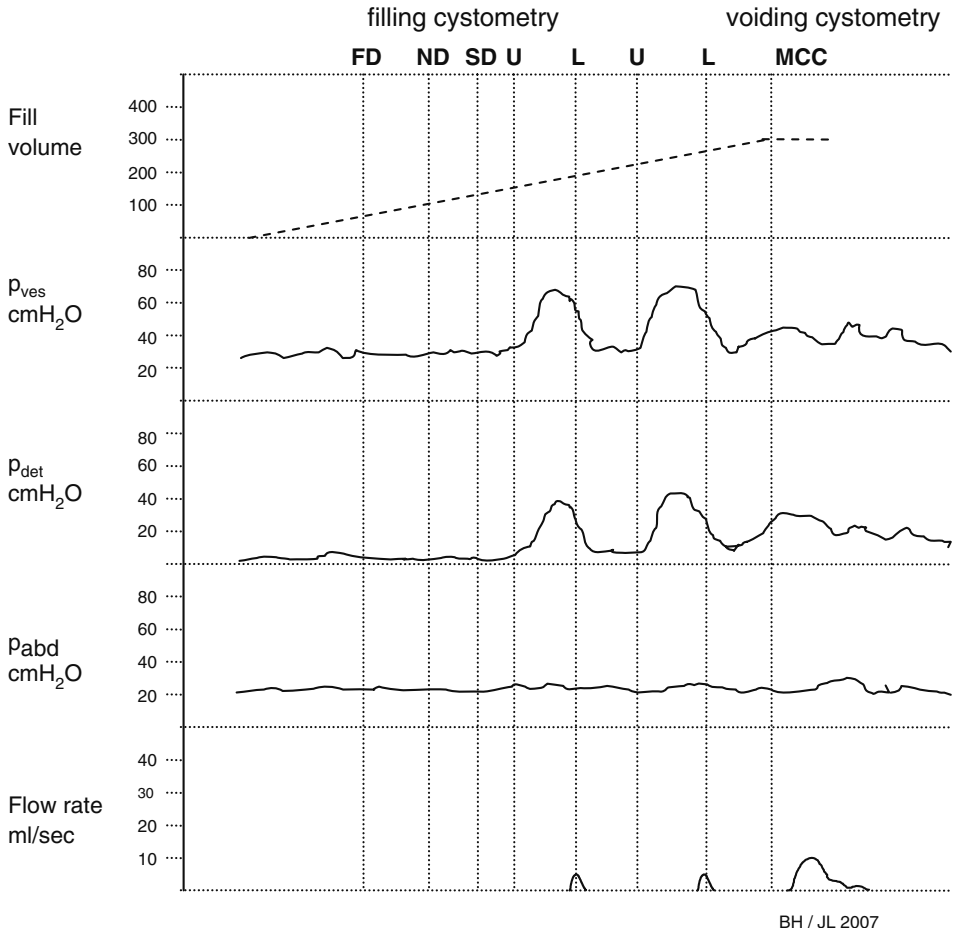

Figure 6. Filling cystometry – detrusor overactivity. Fifty-two-year-old female with urgency and frequency. Phasic detrusor activity during filling. Leakage is associated with urgency and detrusor contractions: (FD) first desire to void; (ND) normal desire to void; (SD) strong desire to void; (U) urgency; (L) leakage; and (MCC) maximum cystometric capacity.

(a) Maximum urethral pressure: maximum pressure in the UPP.
(b) Urethral closure pressure profile (UCPP): the relevant pressure is the urethral closure pressure (urethral pressure minus the intravesical pressure).
(c) Maximum urethral closure pressure (MUCP): maximum pressure in the UCPP, i.e. the maximum difference between the urethral pressure and the intravesical pressure.
(d) Functional profile length: the length of the urethra along which the urethral pressure exceeds intravesical pressure in a woman.
(e) Functional profile length (on stress): the length over which the urethral pressure exceeds the intravesical pressure on stress.
(f) Pressure ''transmission'' ratio: this is the increment in urethral pressure on stress as a percentage of the simultaneously recorded increment in intravesical pressure. For stress profiles obtained during coughing, pressure transmission ratios can be obtained at any point along the urethra. If single values are given, the position in the urethra should be stated. If several transmission ratios are defined at different points along the urethra, a pressure transmission ''profile'' is obtained. During ''cough profiles'', the amplitude of the cough should be stated if possible.

(ii) Urethral closure mechanism (Abrams *et al*. 2002):
(a) 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.
(b) Incompetent urethral closure mechanism: leakage of urine occurs during activities that might raise intra-abdominal pressure in the absence of a detrusor contraction.

(c) Urethral relaxation incompetence (''urethral instability''): leakage caused by urethral relaxation in the absence of raised abdominal pressure or a detrusor contraction.
(d) Urodynamic stress incontinence: this is the involuntary leakage of urine during filling cystometry, associated with increased intra-abdominal pressure, in the absence of a detrusor contraction.

(iii) Leak point pressures (LPPs) (Abrams *et al*. 1988; McGuire *et al*. 1996; Stöhrer *et al*. 1999): there are two types of leak point pressure measurement. The pressure values at leakage should be measured at the moment of leakage.
(a) Detrusor LPP: this a static test. The pressure is the lowest value of the detrusor pressure at which leakage is observed in the absence of increased abdominal pressure or a detrusor contraction. High detrusor LPP (e.g. over 40 cm H_2O (McGuire *et al*. 1996) 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 paraplegia or multiple sclerosis. There are no data on any correlation between detrusor LPP and upper tract damage in non-neurogenic patients.
(b) Abdominal LPP: this is a dynamic test. It is the lowest value of the intentionally increased intravesical pressure that provokes urinary leakage in the absence of a detrusor contraction (Stöhrer *et al*. 1999). The increase in pressure can be induced by a cough (cough LPP) or Valsalva (Valsalva LPP). Multiple estimates at a fixed bladder volume (200–300 mL) are desirable. Catheter size will influence LPP values and should be standardized. Leak point pressure values might also be affected by many other factors such as the technique to confirm urine loss, location of catheter, type of pressure sensor, bladder volume, rate of bladder filling and patient position. A low abdominal LPP is suggestive of poor urethral function.[18]

[18]The correlation between MUCP and abdominal LPP may depend on the catheter type used.

Voiding cystometry (pressure flow studies)

(i) Voiding cystometry: this is the pressure–volume relationship of the bladder during micturition (Stedman 2006). It begins when the ''permission to void'' is given by the urodynamicist and ends when the woman considers her voiding has finished (Abrams *et al*. 2002). Measurements to be recorded should include the intravesical, intra-abdominal and detrusor pressures, and the urine flow rate.

(ii) Measurements during voiding cystometry (Abrams *et al*. 1988, 2002; Schäfer *et al*. 2002):
(a) Pre-micturition pressure: the pressure recorded immediately before the initial isovolumetric contraction.
(b) Opening time: the time elapsed from the initial rise in pressure to the onset of flow. This is the initial isovolumetric contraction period of micturition. It reflects the time taken for the fluid to pass from the point of pressure measurement to the uroflow transducer. Flow measurement delay should be taken into account when measuring the opening time.
(c) Opening pressure: the pressure recorded at the onset of measured flow (consider time delay).
(d) Maximum pressure: maximum value of the measured pressure.
(e) Pressure at maximum flow: pressure recorded at maximum measured flow rate.
(f) Closing pressure: pressure recorded at the end of measured flow.
(g) Contraction pressure at maximum flow: this is the difference between pressure at maximum flow and the pre-micturition pressure.
(h) Flow delay: this is the delay in time between a change in pressure and the corresponding change in measured flow rate.

Figure 7 shows a schematic diagram of voiding cystometry.

(iii) Detrusor function during voiding (Abrams *et al*. 1988, 2002):
(a) Normal detrusor function: normal voiding in women is achieved by an initial (voluntary) reduction in intra-urethral pressure (urethral relaxation) (Morrison & Torrens 2000, p. 20). This is generally followed by a continuous detrusor con-

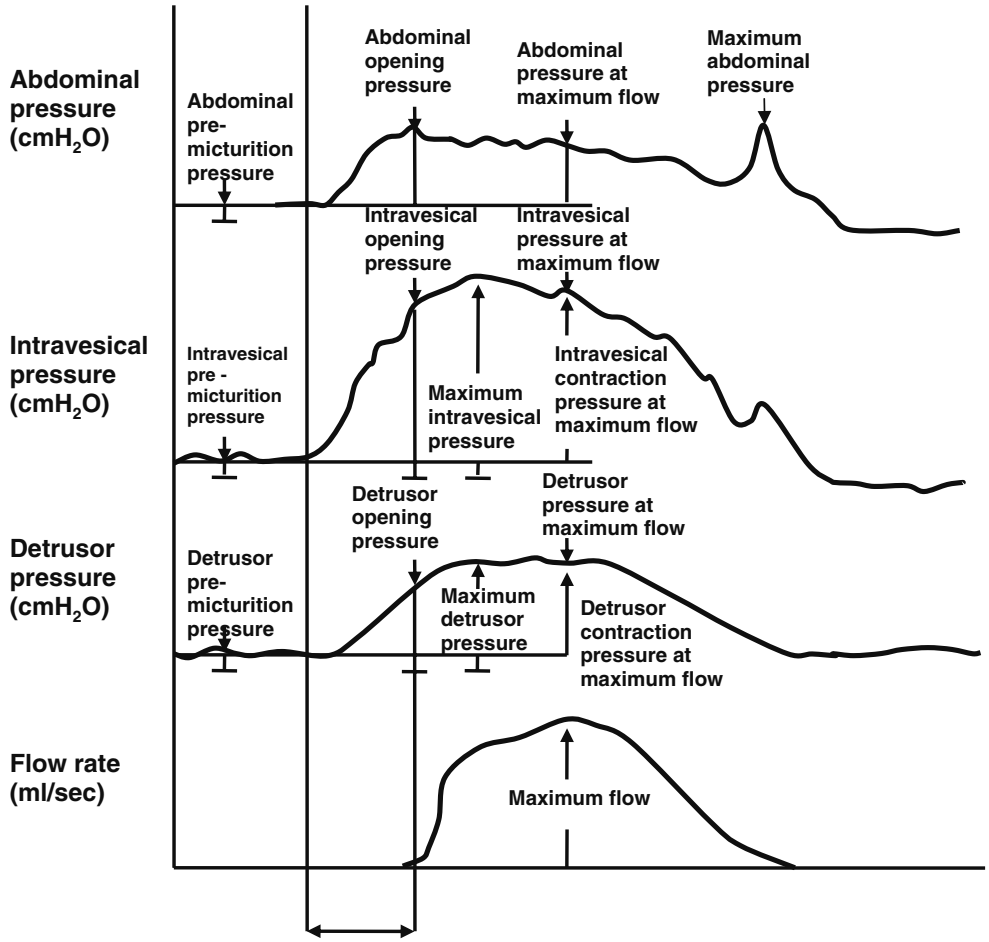

Figure 7. A schematic diagram of voiding cystometry.

traction that leads to complete bladder emptying within a normal time span. Many women will void successfully (normal flow rate and no PVR) by urethral relaxation alone, without much of a rise in detrusor pressure (Tanagho & Miller 1970). The amplitude of the detrusor contraction will tend to increase to cope with any degree of bladder outflow obstruction (Groutz *et al*. 2000).

(b) Detrusor underactivity: detrusor contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span.

(c) Acontractile detrusor: the detrusor cannot be observed to contract during urodynamic studies, resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span. The term *areflexia* has been used where there is a neurological cause, but should be replaced by *neurogenic acontractile detrusor.*

Urethral function during voiding cystometry (voiding urethrocystometry (Abrams et al*. 1988, 2002; Schäfer* et al*. 2002)*

This technique may assist in determining the nature of the urethral obstruction to voiding. Pressure is recorded in the urethra during voiding. This may be at one specific point (e.g. the high-pressure zone) or it may be measured as a profile. A voiding urethral pressure profile uses a similar technique to that described above for the UPP measured during bladder filling. Simultaneous intravesical pressure measurement is required. Localization of the site of the intraurethral pressure measurement is desirable.

(i) Normal urethral function: the urethra opens and is continuously relaxed to allow micturition at a normal pressure, urine flow and PVR.[19]

(ii) Bladder outflow obstruction: this is the generic term for obstruction during voiding.

[19]Symptomatic women with normal detrusor function do not have to rely as much on an increase in detrusor pressure to achieve successful voiding as men. With a shorter urethra (3–4 cm versus 20 cm), urethral relaxation might suffice. The concept of urethral relaxation, prior to detrusor contraction, is a change from prior definitions (Abrams *et al.* 1988, 2002).

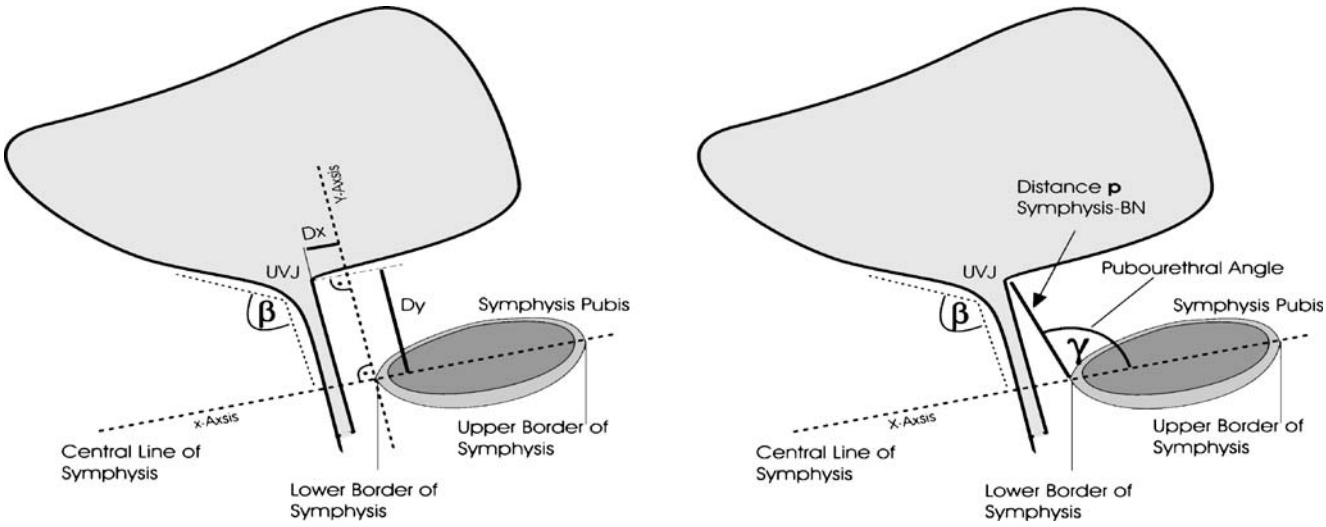

Figure 8. Demonstrates schematically some of the ultrasound parameters. Ultrasound parameters: (γ, gamma) angle between the inferior edge of the symphysis and the urethrovesical junction (UVJ); (h) distance between the UVJ and the horizontal; (p) distance between the inferior edge of the symphysis and the UVJ; (x and y) distance between the UVJ and the x- and y-axes; (X) axis of the symphysis, with 0 at its lower edge; and (Y) axis perpendicular to that of the symphysis (Tunn *et al.* 2005).

It is a reduced urine flow rate, and/or the presence of a raised PVR and an increased detrusor pressure.[20] It is usually diagnosed by studying the synchronous values of urine flow rate and detrusor pressure, and any PVR measurements. A urethral stricture or obstruction caused by higher degrees of uterovaginal prolapse or obstructed voiding after stress incontinence procedures are among possible causes.

(iii) Dysfunctional voiding: this is characterized by an intermittent and/or fluctuating flow rate caused by involuntary intermittent contractions of the peri-urethral striated or levator muscles during voiding in neurologically normal women. This type of voiding may also be the result of an acontractile detrusor (abdominal voiding), with electromyography or video-urodynamics required to distinguish between the two entities.

(iv) Detrusor sphincter dyssynergia: this is incoordination between detrusor and sphincter during voiding caused by a neurological abnormality (i.e. detrusor contraction synchronous with contraction of the urethral and/or peri-urethral striated muscles). This is a feature of neurological voiding disorders. Neurological features should be sought. Video cystourethrography {VCU – ''Radiological imaging'' [i (a)]} is generally valuable to conclude this diagnosis.

[20]In symptomatic women, detrusor voiding pressure, urine flow (rate) and PVR are important markers of bladder outflow obstruction. In the original definition, only detrusor pressure and urine flow rate were included.

Ultrasound imaging (Tunn et al*. 2005)*

(i) Ultrasound in urogynaecology: ultrasound has become an increasingly frequent adjunct investigation in urogynaecology and female urology, both in the office and in the urodynamic laboratory (Fig. 8).

(ii) Modalities in current routine clinical use:
  (a) Perineal: curved array probe applied to the perineum. This term incorporates transperineal and translabial ultrasound.
  (b) Introital: sector probe applied to the vaginal introitus.
  (c) Transvaginal: intravaginal curvilinear, linear array or sector scanning.
  (d) Transabdominal: curvilinear scanning applied to the abdomen.

(iii) Current routine possible uses of ultrasound in urogynaecology and female urology:
  (a) Bladder neck descent/mobility/opening:
    - Position of bladder neck at rest and on Valsalva.[21]
      N.B. Ideally, the Valsalva should be standardized, but it is appreciated that, at present, a reliable non-invasive method is lacking. Consensus has not been reached on criteria for excessive bladder neck mobility nor the relationship of this finding to a diagnosis of urodynamic stress incontinence (Lewicky-Gaupp *et al.* 2009).

[21]In scientific studies, consideration should be given to standardization of the Valsalva strength (e.g. by using an intrarectal pressure transducer).

- Position of bladder neck during pelvic floor contraction.
- Retrovesical angle: i.e. angle between the proximal urethra and the trigonal surface of the bladder.
- Urethral rotation: i.e. rotation of the proximal urethra on Valsalva (see footnote 21).
- Angle gamma: i.e. angle defined by lines from the inferoposterior symphyseal margin to the bladder neck at rest and on Valsalva (see footnote 21).
- Urethral funnelling: i.e. opening of the proximal third of the urethra during coughing or on Valsalva (see footnote 21).
- Urine loss: full urethral opening during coughing, Valsalva (see footnote 21), bladder contraction or micturition.

(b) Post-void residuals: see "Post-void residual (urine volume)".
(c) Intercurrent pelvic pathology (e.g. uterine and adnexal pathology).
(d) Uterine version: anteverted or retroverted; flexion at level of isthmus (Haylen *et al*. 2007b).[22]
(e) Bladder abnormalities (e.g. tumour, foreign body).
(f) Urethral abnormality (e.g. diverticulum).
(g) Postoperative findings (e.g. bladder neck position and mobility, position of meshes, tapes, or implants).
(h) Pelvic floor/levator defects: bladder neck elevation during pelvic floor contraction.
(i) Descent of pelvic organs: visualization of descent of the bladder, uterine cervix and rectum during Valsalva and coughing.

(iv) Three-dimensional (3D) and 4D ultrasound: the potential of 3D ultrasound in urogynaecology and female urology is currently being researched with validated applications likely to be included in future updates of this report and/or separate ultrasound reports. Applications with the most current research include: (1) major morphological abnormalities such as levator defects (Dietz 2007), and (2) excessive distensibility of the puborectalis muscle and levator hiatus ("ballooning"; Dietz *et al*. 2008). The additional diagnostic potential of 4D (i.e. the addition of movement) ultrasound awaits clarification by further research.
(v) Other assessments: synchronous ultrasound screening of the bladder and/or urethra, and measurement of the bladder and abdominal pressure during filling and voiding cystometry.
(vi) Anal ultrasound (endosonography) (Henry & Sultan 2000): this is the gold standard investigation in the assessment of anal sphincter integrity. There is a high incidence of defecatory symptoms in women with anal sphincter defects.

Radiological imaging

(i) Modalities in current routine clinical use:
(a) Video cystourethrography (Monga & Stanton 2000): synchronous radiological screening of the bladder, and measurement of the bladder and abdominal pressure during filling and voiding cystometry. When indicated for complex cases, VCU allows direct observation of the effects of bladder events, the position and conformation of the bladder neck in relation to the pubic symphysis, bladder neck closure during rest and stress, diverticula of the bladder and urethra, vesicovaginal and urethrovaginal fistulae, vesicoureteric reflux, and voiding events.

(ii) Other modalities: none of these are office- or urodynamic-laboratory-based.
(a) Intravenous urography (Monga & Stanton 2000): this provides an anatomical outline of the urinary tract including a nephrogram prior to passage of the contrast to the calyces, renal pelvis, ureter and bladder.
(b) Micturating cystogram (Woodhouse 2000): the principal use is the detection of vesico-ureteric reflux, some fistulae and diverticula.
(c) Defecography (Henry & Sultan 2000): this demonstrates normal anatomy of the anorectum as well as disorders of rectal evacuation. Barium paste is inserted rectally prior to defecation over a translucent commode. Measurement of the anorectal angle is allowed with evidence of the presence, size or emptying of any rectocele. Enteroceles, rectal

[22]The use of transvaginal ultrasound with an empty bladder optimizes this assessment (Haylen *et al*. 2007b).

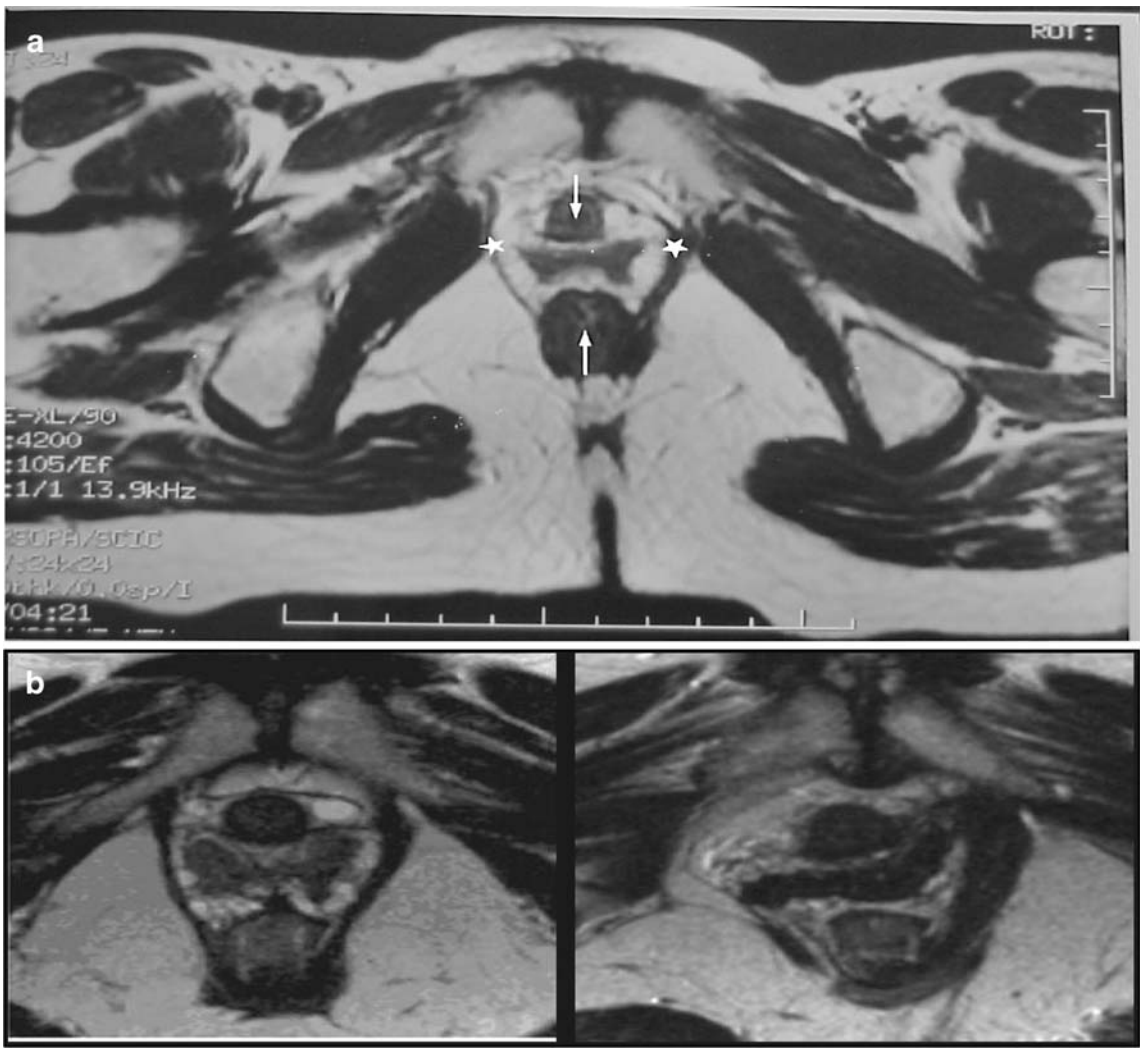

Figure 9. Figure shows a number of possible measurements using magnetic resonance imaging (MRI): (a) Axial T2-weighted image of the pelvic floor of a healthy nulliparous Caucasian woman showing measurement of the anteroposterior diameter of the genital hiatus between the arrows from mid-urethra to mid-anus at the level of the lower border of the pubic symphysis. Transverse diameter (width) of the levator hiatus was measured between the stars at the point of maximum extension of the levator muscles at the level of the urinary bladder and proximal urethra. Reproduced from the *American Journal of Obstetrics and Gynecology* with permission from the publisher (Rizk *et al*. 2004). (b) An example of a unilateral levator defect of the pubococcygeus muscle (right-hand image) seen on MRI. Reproduced with kind permission from Mr Olubenga Adekanmi; image reviewed by Professor John DeLancey.

intussusception and mucosal prolapse might be diagnosed as well as a spastic pelvic floor (anismus).

(d) Colporectocystourethrography (colpocystodefecography) (Monga & Stanton 2000): this involves the instillation of radio-opaque media into the bladder, vagina and rectum simultaneously for pelvic floor evaluation with images obtained during rest and straining.

Magnetic resonance imaging (Fielding 2002; Torricelli et al*. 2002)*

(i) Magnetic resonance imaging in urogynaecology and female urology: MRI provides the opportunity to examine the soft-tissue structures of the pelvic support apparatus *in toto.* 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, such as increased abdominal pressure during Valsalva (Fielding 2002; Torricelli *et al*. 2002). Several anatomical landmarks used for pelvic measurements are also easily identified in MRI and most measurements are thus highly reproducible (Fig. 9). Currently, the clinical value of these examinations is still under investigation with its impact on therapeutic decisions not yet fully evaluated.

(ii) Current possible measurements using MRI in urogynaecology and female urology (Fielding 2002; Torricelli *et al*. 2002):
  (a) Bladder neck and cervical descent/mobility:
    - Position of bladder neck and cervix at rest and on Valsalva.
    - Pubococcygeal line: a line extending from the inferior border of the pubic symphysis to the last joint of the coccyx. Bladder neck or cervical descent >2 cm below this line with straining indicates weakness of the pelvic floor. If alternative landmarks are used in scientific papers, these should be clearly described.
  (b) Intercurrent pelvic pathology (e.g. fibroids, ovarian pathology).
  (c) Uterine version: anteverted or retroverted; flexion at the isthmus (Rizk *et al*. 2005).
  (d) Bladder abnormalities (e.g. tumour, foreign body).
  (e) Urethral abnormality (e.g. diverticulum).
  (f) Post-operative findings (e.g. bladder neck mobility).
  (g) Pelvic floor measurements/levator defects: assessment of the configuration of PFMs; in particular, the levator ani.
  (h) Descent of pelvic organs.

  N.B. Diagnostic ability may be enhanced by the use of 3D MRI. New techniques with a high-speed sequence of pictures allow functional MRI.

Diagnoses (most common)[23]

This report again (Abrams *et al*. 1988, 2002) highlights the need to base diagnoses for female pelvic floor dysfunction on the correlation between a woman's symptoms, signs and any relevant diagnostic investigations.

Urodynamic stress incontinence

Definition: as noted in "Urethral function during filling cystometry" [ii (d)], this 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 contraction.[24]

Detrusor overactivity

Definition: as noted in "Filling cystometry" [v (b)], this diagnosis by *symptoms and urodynamic investigations* is made in women with lower urinary tract symptoms [more commonly OAB-type symptoms – "Bladder storage symptoms" (iv)] when involuntary detrusor muscle contractions occur during filling cystometry.[25]

Bladder oversensitivity

Definition: bladder oversensitivity, a diagnosis made by *symptoms and urodynamic investigations*, is more likely to occur in women with symptoms of frequency and nocturia, and a voiding diary showing a clearly reduced average voided volume. Also referred to as "increased bladder sensation" (Abrams *et al*. 2002), bladder oversensitivity replaces the now obsolete term of "sensory urgency" (Creighton & Dixon 2000; Haylen *et al*. 2007a). As noted in "Filling cystometry" [iii (f)], it can be defined as an increased perceived bladder sensation during bladder filling ["Sensory symptoms" (i)] with specific cystometric findings of: (1) an early first desire to void {"Filling cystometry" [iii (b)]}; (2) an early strong desire to void, which occurs at low bladder volume {"Filling cystometry" [iii (d)]}; and (3) a low maximum cystometric bladder capacity {"Filling cystometry" [iv (b)]}; no abnormal increases in detrusor pressure (Creighton & Dixon 2000; Haylen *et al*. 2007a). Specific bladder volumes at which these findings occur will vary in different populations. There should be no known or suspected urinary tract infection.[26]

Voiding dysfunction

(i) *Definition*: voiding dysfunction, a diagnosis by *symptoms and urodynamic investigations*, is defined as abnormally slow and/or incomplete micturition (Sutherst *et al*. 1990, p. 121). Abnormally slow urine flow rates and abnormally high post-void residuals, the basis of this diagnosis, are outlined in

[23]The most common diagnoses are those where there is evidence for a prevalence of 10% or more in women presenting with symptoms of pelvic floor dysfunction.

[24]This is the most common urogynaecological diagnosis, occurring in up to 72% patients presenting for the first time (Haylen *et al*. 2007c). This diagnosis may be made in the absence of the symptom of stress (urinary) incontinence in women who have the sign of occult or latent stress incontinence.

[25]The prevalence of detrusor overactivity can vary widely between 13% (Haylen *et al*. 2007c) and 40% (Wise 2001, p. 903) of patients undergoing urodynamic studies at different centres.

[26]The prevalence of the oversensitive bladder in urogynaecology and female urology patients (from studies on the now obsolete term "sensory urgency") is around 10–13% (Wise 2001, p. 912; Haylen *et al*. 2007a).

"Uroflowmetry" (x) and "Post-void residual (urine volume)" (iii). This diagnosis should be based on a repeated measurement to confirm abnormality.[27]

(ii) *Further evaluation – pressure-flow studies (voiding cystometry)*. Pressure-flow studies are indicated to evaluate the cause of any voiding dysfunction. Some possible causes have been already defined:

- "Voiding cystometry (pressure flow studies)" [iii (b)], detrusor underactivity;
- "Voiding cystometry (pressure flow studies)" [iii (c)], acontractile detrusor;
- "Urethral function during voiding cystometry (voiding urethrocystometry)" (ii), bladder outflow obstruction.

(iii) Alternative presentations:
  (a) Acute retention of urine (Abrams *et al.* 2002): this is defined as a generally (but not always) painful, palpable or percussable bladder, when the patient is unable to pass any urine when the bladder is full.
  (b) Chronic retention of urine: this is defined as a non-painful bladder where there is a chronic high PVR.[28]

Pelvic organ prolapse

Definition: this diagnosis ["Signs of pelvic organ prolapse" (i)], by *symptoms and clinical examination assisted by any relevant imaging*, involves the identification of descent of one or more of the anterior vaginal wall (central, paravaginal or combination cystocele), posterior vaginal wall (rectocele), the uterus (cervix) or the apex of the vagina (vaginal vault or cuff scar) after hysterectomy.[29] The presence of any such sign should correlate with relevant POP symptoms.

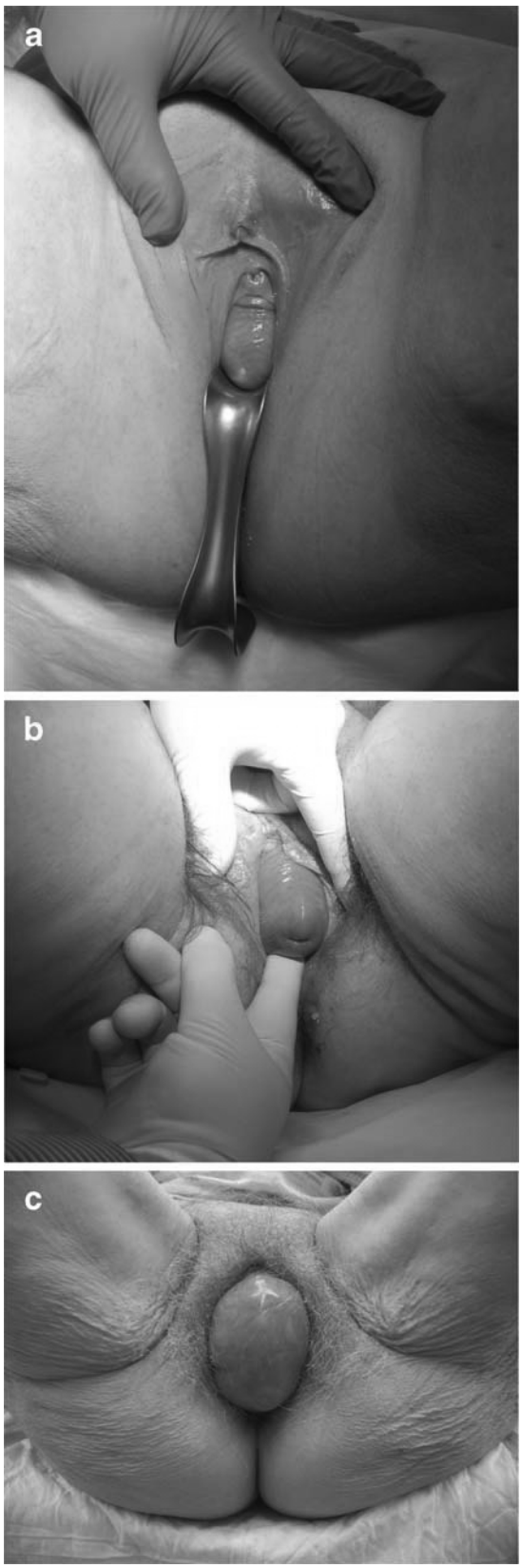

Figure 10. Different types and stages of pelvic organ prolapse: (a) stage II anterior vaginal wall prolapse; (b) stage III uterine prolapse; and (c) stage IV vaginal vault prolapse.

Figure 10 demonstrates different types and stages of clinical presentations of prolapse. Figure 10a does not distinguish cystocele type.

[27]Depending on definition, voiding dysfunction has a prevalence of 14% (Massey & Abrams 1988) to 39% (Haylen *et al.* 2007c), the latter figure making it either the third or fourth most common urodynamic diagnosis (after urodynamic stress incontinence, POP and possibly detrusor overactivity).

[28]Approximately 2% of post-void residual measurements are over 200 mL (Haylen *et al.* 2008a). This is a suggested cut-off.

[29]Around 61% (Haylen *et al.* 2007c) of women presenting for initial urogynaecological assessment will have some degree of prolapse, not always symptomatic. Objective findings of prolapse in the absence of relevant prolapse symptoms may be termed "anatomic prolapse". Approximately half of all women over the age of 50 years have been reported to complain of symptomatic prolapse (Swift 2000). There is a 10% lifetime incidence for women of undergoing surgery to correct pelvic organ prolapse (Brown *et al.* 2002).

Recurrent urinary tract infections

Definition: this diagnosis by *clinical history* assisted by *the results of diagnostic tests* involves the determination of the occurrence of at least three symptomatic and medically diagnosed urinary tract infections over the previous 12 months.[30]

Acknowledgements/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. It is pleasing that the ICS leadership has accepted this joint IUGA/ICS initiative as a means of progress in this important and most basic area.

This document has involved 12 rounds of full review, by co-authors, of an initial draft, with the collation of comments (and figures – version 14). Following website publication, there have been a further two rounds to review the comments made. Versions 7, 9, 11 and 17 were subject to live meetings in London, UK (June 2008), Taipei, Taiwan (September 2008), Cairo, Egypt (October 2008), Lake Como, Italy (June 2009), and San Francisco, CA, USA (September 2009). The co-authors acknowledge the input to an early version of the document by Professor Don Wilson and Dr Jenny King. Versions 9, 10 and 12 were subject to external review. The extensive comments by those reviewers, Professor Gunnar Lose (version 9), Dr Søren Brostrøm (version 10), Mr Philip Toozs-Hobson (version 10), Mr Ralph Webb, Dr Kristene Whitmore and Professor Cor Baeten (version 12), are also gratefully acknowledged. The comments by the following reviewers in response to website publication (December 2008–January 2009) are also much appreciated: Dr Kiran Ashok, Dr Rufus Cartwright, Dr Johannes Coetzee, Professor Peter Dietz, Dr Howard Goldman, Mr Sharif Ismail, Mrs Jane Meijlink and Professor Don Ostergard. Version 16 was subject to a further invited external review by Professor Ted Arnold, Professor Jacques Corcos, Dr Harry Vervest and Professor Jean- Jacques Wyndaele, and the consideration of comments by Professor Paul Abrams and Professor Werner Schaefer. Version 17 will be for website and dual journal publication.

[30]Using this definition, two or more, and three or more UTIs can occur with a prevalence of 19% and 11%, respectively, in women presenting with symptoms of pelvic floor dysfunction (Haylen *et al*. 2009). This then becomes a significant, generally intercurrent, diagnosis likely to require treatment additional to that planned for the other diagnoses found.

Conflicts of interest

B. T. Haylen: assistance from Boston Scientific to attend London Terminology Meeting.
D. De Ridder: advisor for Astellas, Allergan, Ipsen, Bard, American Medical Systems and Xention; speaker for Astellas, Allergan, American Medical Systems, Bard and Pfizer; and investigator for Ipsen, American Medical Systems, Allergan, Astellas and Johnson & Johnson.
R. M. Freeman: past advisory boards: Lilly/BI, Astellas and Pfizer.
S. E. Swift: no disclosures.
B. Berghmans: no disclosures.
J. Lee: no disclosures.
A. Monga: consultant for Gynecare, and advisor for Astellas and Pfizer.
E. Petri: no disclosures.
D. E. Rizk: no disclosures.
P. K. Sand: advisor for Allergan, Astellas, GSK, Coloplast, Ortho, Pfizer, Sanofi, Aventis and Watson; speaker for Allergan, Astellas, GSK, Ortho, Pfizer and Watson; and investigator for Boston Scientific, Pfizer, Watson, Ortho and Bioform.
G. N. Schaer: advisor (in Switzerland) for Astellas, Novartis and Pfizer.

References

Abrams P., Blaivas J. G., Stanton S. L. & Andersen J. T. (1988) The standardisation of terminology of lower urinary tract function. The International Continence Society Committee on Standardisation of Terminology. *Scandinavian Journal of Urology and Nephrology, Supplementum* **114**, 5–19.

Abrams P., Cardozo L., Fall M., *et al*. (2002) The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. *Neurourology and Urodynamics* **21** (2), 167–178.

Basson R., Berman J., Burnett A., *et al*. (2000) Report of the international consensus development conference on female sexual dysfunction: definitions and classifications. *The Journal of Urology* **163** (3), 888–893.

Blaivas J. G., Appell R. A., Fantl J. A., *et al*. (1997) Definition and classification of urinary incontinence: recommendations of the Urodynamic Society. *Neurourology and Urodynamics* **16** (3), 149–151.

Brown J. S., Waetjen L. E., Subak L. L., *et al*. (2002) Pelvic organ prolapse surgery in the United States, 1997. *American Journal of Obstetrics and Gynecology* **186** (4), 712–716.

Bump R. C., Mattiasson A., Bø K., *et al.* (1996) The standardization of female pelvic organ prolapse and pelvic floor dysfunction. *American Journal of Obstetrics and Gynecology* **175** (1), 10–17.

Cardozo L. D. (2000) Urinary frequency and urgency. In: *Clinical Urogynaecology*, 2nd edn (eds S. L. Stanton & A. K. Monga), pp. 309–319. Churchill Livingstone, Edinburgh.

Costantini E., Mearini E., Pajoncini C., *et al.* (2003) Uroflowmetry in female voiding disturbances. *Neurourology and Urodynamics* **22** (6), 569–573.

Creighton S. M. & Dixon J. (2000) Bladder hypersensitivity. In: *Clinical Urogynaecology*, 2nd edn (eds S. L. Stanton & A. K. Monga), pp. 321–327. Churchill Livingstone, Edinburgh.

Dietz H. P. (2007) Quantification of major morphological abnormalities of the levator ani. *Ultrasound in Obstetrics and Gynecology* **29** (3), 329–334.

Dietz H. P., Shek C., De Leon J. & Steensma A. B. (2008) Ballooning of the levator hiatus. *Ultrasound in Obstetrics and Gynecology* **31** (6), 676–680.

Dietz H. P. & Shek C. (2008) Validity and reproducibility of the digital detection of levator trauma. *International Urogynecology Journal* **19** (8), 1097–1101.

Drossman D. A. (1999) The functional gastrointestinal disorders and the Rome II process. *Gut* **45** (Suppl. II), II1–II6.

Fantl J. A., Smith P. J., Schneider V., Hurt W. G. & Dunn L. J. (1983) Fluid weight uroflowmetry in women. *American Journal of Obstetrics and Gynecology* **145** (8), 1017–1024.

Fielding J. R. (2002) Practical MRI imaging of female pelvic floor weakness. *RadioGraphics* **22** (2), 295–304.

Fitzgerald M. P. & Brubaker L. (2003) Variability of 24-hour voiding diary variables among asymptomatic women. *The Journal of Urology* **169** (1), 207–209.

Groutz A., Blaivas J. G. & Chaikin D. C. (2000) Bladder outlet obstruction in women: definition and characteristics. *Neurourology and Urodynamics* **19** (3), 213–220.

Haylen B. T., Ashby D., Sutherst J. R., Frazer M. I. & West C. R. (1989) Maximum and average urine flow rates in normal male and female populations – the Liverpool nomograms. *British Journal of Urology* **64** (1), 30–38.

Haylen B. T., Parys B. T., Anyaegbunam W. I., Ashby D. & West C. R. (1990) Urine flow rates in male and female urodynamic patients compared with the Liverpool nomograms. *British Journal of Urology* **65** (5), 483–487.

Haylen B. T., Chetty N., Logan V., *et al.* (2007a) Is sensory urgency part of the same spectrum of bladder dysfunction as detrusor overactivity? *International Urogynecology Journal and Pelvic Floor Dysfunction* **18** (2), 123–128.

Haylen B. T., McNally G., Ramsay P., Birrell W. & Logan V. (2007b) A standardised ultrasonic diagnosis and an accurate prevalence for the retroverted uterus in general gynaecology patients. *The Australian and New Zealand Journal of Obstetrics and Gynaecology* **47** (4), 326–328.

Haylen B. T., Krishnan S., Schulz S., *et al.* (2007c) Has the true incidence of voiding difficulty in urogynecology patients been underestimated? *International Urogynecology Journal and Pelvic Floor Dysfunction* **18** (1), 53–56.

Haylen B. T., Lee J., Logan V., *et al.* (2008a) Immediate postvoid residual volumes in women with symptoms of pelvic floor dysfunction. *Obstetrics and Gynecology* **111** (6), 1305–1312.

Haylen B. T., Yang V. & Logan V. (2008b) Uroflowmetry: its current clinical utility in women. *International Urogynecology Journal and Pelvic Floor Dysfunction* **19** (7), 899–903.

Haylen B. T., Lee J., Husselbee S., Law M. & Zhou J. (2009) Recurrent urinary tract infections in women with symptoms of pelvic floor dysfunction. *International Urogynecology Journal and Pelvic Floor Dysfunction* **20** (7), 837–842.

Haylen B. T. & Chetty N. (2007) International Continence Society 2002 terminology report: have urogynecological conditions (diagnoses) been overlooked? *International Urogynecology Journal and Pelvic Floor Dysfunction* **18** (4), 373–377.

Haylen B. T. & Lee J. (2008) The accuracy of post-void residual measurement in women. [Editorial.] *International Urogynecology Journal and Pelvic Floor Dysfunction* **19** (5), 603–606.

Henry M. M. & Sultan A. H. (2000) Lower intestinal tract disease. In: *Clinical Urogynaecology*, 2nd edn (eds S. L. Stanton & A. K. Monga), pp. 444–445. Churchill Livingstone, Edinburgh.

Labat J. J., Riant T., Robert R., *et al.* (2008) Diagnostic criteria for pudendal neuralgia by pudendal nerve entrapment (Nantes criteria). *Neurourology and Urodynamics* **27** (4), 306–310.

Lewicky-Gaupp C., Blaivas J., Clark A., *et al.* (2009) "The cough game": are there characteristic urethrovesical movement patterns associated with stress incontinence? *International Urogynecology Journal and Pelvic Floor Dysfunction* **20** (2), 171–175.

Lose G., Griffiths D., Hosker G., *et al.* (2002) Standardisation of urethral pressure measurement: report from the Standardization Sub-committee of the International Continence Society. *Neurourology and Urodynamics* **21** (3), 258–260.

McGuire E. J., Cespedes R. D. & O'Connell H. E. (1996) Leak-point pressures. *Urologic Clinics of North America* **23** (2), 253–262.

Massey J. A. & Abrams P. H. (1988) Obstructed voiding in the female. *British Journal of Urology* **61** (1), 36–39.

Messelink B., Benson T., Berghmans B., *et al.* (2005) Standardization of terminology of pelvic floor muscle function and dysfunction: report from the pelvic floor clinical assessment group of the International Continence Society. *Neurourology and Urodynamics* **24** (4), 374–380.

Monga A. K. & Stanton S. L. (2000) Radiology and MRI. In: *Clinical Urogynaecology*, 2nd edn (eds S. L. Stanton & A. K. Monga), pp. 103–116. Churchill Livingstone, Edinburgh.

Morrison J. F. B. & Torrens M. J. (2000) Neurophysiology. In: *Clinical Urogynaecology*, 2nd edn (eds S. L. Stanton & A. K. Monga), pp. 19–30. Churchill Livingstone, Edinburgh.

Norton C., Christansen J., Butler U., *et al.* (2002) Anal incontinence. In: *Incontinence – Report of the Second WHO International Consultation on Incontinence*, 2nd edn (eds P. Abrams, S. E. Khoury & A. J. Wein), pp. 985–1044. Health Publications, Plymouth.

Ricci J. V. (1945) *One Hundred Years of Gynaecology, 1800–1900.* Blakiston, Philadelphia, PA.

Rizk D. E., Czechowski J. & Ekelund L. (2004) Dynamic assessment of pelvic floor and bony pelvis morphologic condition with the use of magnetic resonance imaging in

a multiethnic, nulliparous, and healthy female population. *American Journal of Obstetrics and Gynecology* **191** (1), 83–89.

Rizk D. E., Czechowski J. & Ekelund L. (2005) Magnetic resonance imaging of uterine version in a multi-ethnic, nulliparous, healthy female population. *Journal of Reproductive Medicine* **50** (2), 81–83.

Rogers G. R., Villarreal A., Kammerer-Doak D. & Qualls C. (2001) Sexual function in women with and without urinary incontinence and/or pelvic organ prolapse. *International Urogynecology Journal and Pelvic Floor Dysfunction* **12** (6), 361–365.

Schäfer W., Abrams P., Liao L., *et al.* (2002) Good urodynamic practices: uroflowmetry, filling cystometry, and pressure-flow studies. *Neurourology and Urodynamics* **21** (3), 261–274.

Stedman T. L. (2006) *Stedman's Medical Dictionary*, 28th edn. Lippincott, Williams and Wilkins, Baltimore, MD.

Stöhrer M., Goepel M., Kondo A., *et al.* (1999) The standardization of terminology in neurogenic lower urinary tract dysfunction: with suggestions for diagnostic procedures. International Continence Society Standardization Committee. *Neurourology and Urodynamics* **18** (2), 139–158.

Sutherst J. R., Frazer M. I., Richmond D. H. & Haylen B. T. (1990) *An Introduction to Clinical Gynaecological Urology.* Butterworth–Heinemann, Oxford.

Swift S. E. (2000) The distribution of pelvic organ support in a population of female subjects seen for routine gynaecologic health care. *American Journal of Obstetrics and Gynecology* **183** (2), 277–285.

Swift S., Woodman P., O'Boyle A., *et al.* (2005) Pelvic Organ Support Study (POSST): the distribution, clinical definition, and epidemiologic condition of pelvic organ support defects. *American Journal of Obstetrics and Gynecology* **192** (3), 795–806.

Swift S. E., Tate S. B. & Nicholas J. (2003) Correlation of symptomatology with degree of pelvic organ support in a general population of women: what is pelvic organ prolapse? *American Journal of Obstetrics and Gynecology* **189** (2), 372–379.

Tanagho E. A. & Miller E. R. (1970) The initiation of voiding. *British Journal of Urology* **42** (2), 175–183.

Torricelli P., Pecchi A., Caruso Lombardi A., *et al.* (2002) Magnetic resonance imaging in evaluating functional disorders of female pelvic floor. *La Radiologia Medica* **103** (5–6), 488–500.

Tunn R., Schaer G., Peschers U., *et al.* (2005) Updated recommendations on ultrasonography in urogynecology. *International Urogynecology Journal and Pelvic Floor Dysfunction* **16** (3), 236–241.

Van Kerrebroeck P., Abrams P., Chaikin D., *et al.* (2002) The standardization of terminology in nocturia: report from the Standardization Sub-committee of the International Continence Society. *Neurourology and Urodynamics* **21** (2), 179–183.

Weber A. M., Abrams P., Brubaker L., *et al.* (2001) The standardization of terminology for researchers in female pelvic floor disorders. *International Urogynecology Journal and Pelvic Floor Dysfunction* **12** (3), 178–186.

Wise B. (2001) Frequency/urgency syndromes. In: *Textbook of Female Urology and Urogynaecology* (eds L. D. Cardozo & D. Staskin), p. 903. Isis Medical Media, London.

Woodhouse C. R. J. (2000) General urological investigations. In: *Clinical Urogynaecology*, 2nd edn (eds S. L. Stanton & A. K. Monga), pp. 88–90. Churchill Livingstone, Edinburgh.

Yang A., Mostwin J., Genadry R. & Sanders R. Z. (1993) Patterns of prolapse demonstrated with dynamic fastscan MRI; reassessment of conventional concepts of pelvic floor weaknesses. *Neurourology and Urodynamics* **12** (4), 310–311.

Bernard T. Haylen, Robert M. Freeman, Steven E. Swift, Joseph Lee, Eckhard Petri, Diaa E. Rizk, Peter K. Sand and Gabriel N. Schaer are members of the Standardization and Terminology Committees, IUGA. Dirk de Ridder, Robert M. Freeman, Bary Berghmans, Ash Monga and Peter K. Sand are members of the Standardization and Terminology Committees, ICS. Bernard T. Haylen, Dirk de Ridder, Robert M. Freeman, Steven E. Swift, Bary Berghmans, Ash Monga and Peter K. Sand are members of the Joint IUGA/ICS Working Group on Female Terminology.

This article is reprinted from the International Urogynecology Journal *by kind permission of the publishers, Springer. Original publication:* International Urogynecology Journal, *Vol. 21, No. 1, pp. 5–26 (January 2010).*

