CHAPTER 9

Committee 5

Initial Assessment of Incontinence

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INTRODUCTION

Urinary (UI) and faecal incontinence (FI) are a concern for individuals of all ages and both sexes. This committee report primarily addresses the role of the initial clinical assessment of urinary incontinence in female and male patients. In addition to urinary incontinence the symptom assessment is expanded to include lower urinary tract symptoms (LUTS) and signs of lower urinary tract dysfunction (LUTD) without urinary loss. The sub-populations of female patients with pelvic prolapse, male patients with prostatic enlargement, the paediatric and geriatric age groups, and the neurologically impaired are considered separately. Recommendations are also made in a separate sub-section for the initial evaluation of those patients who present with faecal incontinence. These sub-sections should be utilized in conjunction with other Committee Reports and the final recommendations of the Consultation, which are presented in simplified form as treatment algorithms in Management Recommendations III.

For the purpose of this report, the 'initial assessment' represents the components of the history, physical examination, and laboratory testing, and if deemed necessary, radiographic tests and simple or more complex testing that may be recommended in order to:

1. establish a presumptive or condition specific diagnosis, and exclude underlying organ-specific related or unrelated conditions that would require intervention
2. assess the level of bother and desire for intervention from information obtained from the patient or caregiver
3. institute empiric or disease specific therapy based on the risk and benefit of the untreated condition, the nature of the intervention and the alternative therapies
4. prompt the recommendation of additional more complex testing or specialist referral.

Lower urinary tract symptoms are defined from the individual's perspective and are either volunteered by, or elicited from the individual or described by the individual's caregiver. Whilst LUTS cannot be used to make a definitive diagnosis of LUTD, they may be suggestive, and may also indicate pathologies other than LUTD, such as urinary infection or more serious underlying conditions. Signs suggestive of LUTD are observed by the physician including simple means to verify symptoms and quantify them. In each specific circumstance, urinary or faecal incontinence should be further described by specifying relevant factors such as type, frequency, severity, precipitating factors, social impact, effect on hygiene and quality of life, the measures used to contain the leakage and whether or not the individual seeks or desires help. A clinical assessment of the efficiency of bladder or colorectal storage and emptying, and basic laboratory tests such urinalysis as testing for urinary or faecal infection or blood should be considered before instituting therapy, or initiating special investigations. More advanced testing of lower urinary tract or colorectal storage or emptying, additional laboratory analysis for lower urinary tract or colorectal organ system related infection or malignancy, and fluid balance / renal function and dietary / alimentary tract function should be dictated by the findings of the basic evaluation.

Pathology may affect urinary or faecal production, or the cognitive, motivational, physical, and environmental factors that determine the ability to perform

toileting functions effectively. The physician should elicit neurological symptoms and signs that may indicate alterations in the control of the lower urinary tract or bowel function.

The requirements of specific sub-populations negate the ability to recommend a 'universal' initial evaluation. Specific risks for combined storage and emptying abnormalities and upper urinary tract dysfunction in the neurogenic bladder population, mandates a more involved initial evaluation. Congenital and maturational issues in the paediatric subgroup and medical co-morbidity in the geriatric group present unique challenges. Prostatic obstruction in the male and pelvic prolapse in the female present uniquely different challenges related to lower urinary tract function.

Empiric therapy based on the initial assessment must consider the degree of bother, and the costs of further evaluation, balanced against the consequences of a failure to diagnose an underlying condition, the risk and benefits of conservative management or pharmacological therapy and the need for an accurate diagnosis before more complex intervention. The burden of these conditions and the availability of resources require that primary intervention strategies be formulated from evidence based decisions emanating from the initial evaluation.

I. LOWER URINARY TRACT SYMPTOMS

Symptoms are either volunteered by, or elicited from, the individual or may be described by the individual's caregiver. The International Continence Society (ICS) has classified lower urinary tract symptoms (LUTS) into storage, voiding, and postmicturition symptoms. [1] The National Institutes of Health (NIH) recommend similar (but not identical) standards of terminology in pelvic floor disorders. [2] Although an accurate urological history will not establish a definitive diagnosis it will ultimately guide investigation and treatment. [1]

The following section summarises the definitions of symptoms described by the International Continence Society. [1] NIH definitions are given (*in italics and in parentheses*) where they differ from ICS terminology.

1. Storage symptoms

Increased daytime frequency is the complaint of voiding too often by day (NIH - *the statement that the patient voids eight or more times in 24 hours*).

Increased daytime frequency may arise in the presence of a normal bladder capacity when there is excessive fluid intake, or when bladder capacity is restricted secondary to detrusor overactivity, impaired bladder compliance, or increased bladder sensation.

Nocturia is the complaint that the individual has to wake at night one or more times to void (NIH - *the statement that the patient wakes from sleep to pass urine*). The term 'night time frequency' differs from that for nocturia, as it includes voids that occur after the individual has gone to bed, but before he/she has gone to sleep, and voids which occur in the early morning which prevent the individual from getting back to sleep as he/she wishes. These voids before and after sleep may need to be considered in research studies, for example, in nocturnal polyuria. If this definition were used then an adapted definition of daytime frequency would need to be used with it.

Nocturia may arise for similar reasons to daytime frequency, but may also occur with congestive heart failure due to increased venous return on lying flat, or to reversal of the normal circadian rhythm in antidiuretic hormone secretion.

Urgency is the complaint of a sudden compelling desire to pass urine which is difficult to defer (NIH – *the statement that the patient feels a strong need to pass urine for fear of leakage*).

Urinary incontinence is the complaint of any involuntary leakage of urine. In each specific circumstance, urinary incontinence should be further described by specifying relevant factors such as type, frequency, severity, precipitating factors, social impact, effect on hygiene and quality of life, the measures used to contain the leakage (wearing of protection, number and type of pads and change of underwear or outer clothes) and whether or not the individual seeks or desires help because of urinary incontinence. Urinary leakage may need to be distinguished from sweating or vaginal discharge.

Stress urinary incontinence is the complaint of involuntary leakage on effort or exertion, or on sneezing or coughing (NIH – *the patient's or caregiver's statement of involuntary loss of urine during physical exertion*).

Urge urinary incontinence is the complaint of involuntary leakage accompanied by or immediately preceded by urgency. Urge incontinence can present in different symptomatic forms; for example, as fre-

quent small losses between micturitions or as a catastrophic leak with complete bladder emptying. Information should be sought on triggering events such as cold, running water and 'latch key' incontinence.

Mixed urinary incontinence is the complaint of involuntary leakage associated with urgency and also with exertion, effort, sneezing or coughing.

Nocturnal enuresis is the complaint of loss of urine occurring during sleep. Enquiry should include previous childhood nocturnal enuresis as delayed bladder control in childhood is associated with detrusor overactivity in adulthood.

Continuous urinary incontinence is the complaint of continuous leakage.

Other types of urinary incontinence may be situational, for example the report of incontinence during sexual intercourse, or giggle incontinence. Coital incontinence may occur during arousal, on penetration, throughout intercourse, or specifically on orgasm; although urodynamic stress incontinence is the most common urodynamic finding in each of these situations, detrusor overactivity is found more often when leakage is restricted to orgasm. [3]

Bladder sensation may be categorised as:

- **Normal:** the individual is aware of bladder filling and increasing sensation towards capacity.
- **Increased:** the individual feels an early and persistent desire to void.
- **Reduced:** the individual is aware of bladder filling but does not feel a definite desire to void.
- **Absent:** the individual reports no sensation of bladder filling or desire to void.
- **Non-specific:** the individual reports no specific bladder sensation but may perceive bladder filling as abdominal fullness, vegetative symptoms, or spasticity. These symptoms are most frequently seen in neurological patients, particularly those with spinal cord trauma or malformation.

2. Voiding symptoms

Voiding symptoms may occur in situations of overactive outflow, or under active detrusor. [1] The former may be secondary to outlet obstruction from urogenital prolapse, urethral stricture or following previous bladder neck surgery. Detrusor atonia or hypotonia is however much more common in the female, and may arise idiopathically, or secondarily to over distension after parturition or surgery, in peripheral neuropathy due to diabetes mellitus, and in other neurological conditions. Women with prolapse may require to digitate vaginally to initiate or complete voiding.

Slow stream is the individual's perception of reduced urine flow, usually compared to previous performance or in comparison to others.

Intermittent stream (intermittency) is when the individual describes urine flow which stops and starts, on one or more occasions, during micturition.

Hesitancy is when an individual describes difficulty in initiating micturition resulting in a delay in the onset of voiding after the individual is ready to pass urine.

Straining to void describes the muscular effort used to initiate, maintain or improve the urinary stream.

Terminal dribble is the term used when an individual describes a prolonged final part of micturition, when the flow has slowed to a trickle.

3. Post-micturition symptoms

Post micturition symptoms are experienced immediately after micturition.

Feeling of incomplete emptying is a self-explanatory term for a feeling experienced by the individual after passing urine.

Post micturition dribble is the term used when an individual describes the involuntary loss of urine immediately after he or she has finished passing urine, usually after leaving the toilet in men, or after rising from the toilet in women.

4. Measuring the Frequency and Severity of Lower Urinary Tract Symptoms

The frequency-volume chart or micturition diary records a patient's voiding pattern during normal daily activities. In some women it may be therapeutic as it provides them with insight into their bladder behaviour. [4] The ICS has described three different forms of diary, namely the micturition time chart which records the timing of voids in twenty four hours; the frequency volume chart (FVC) which also includes the volumes voided , and the bladder diary which in addition includes incontinence episodes, pad usage, fluid intake, degree of urgency and degree of incontinence. [1] However, increasing either the complexity of the diary or duration of recording is associated with poorer compliance. [5] The optimum duration of recording depends on the clinical context

and the purpose of the measurement. A properly performed 1-day FVC, which includes the first morning void the following day, is a reasonable tool to gain insight into voiding habits during normal daily routine. However, a 3-day FVC or diary is recommended for accurate assessment of lower urinary tract symptoms and for confirming a consistent clinical pattern in day-to-day practice. Although never completely diagnostic, several different diary patterns have been described which may characterise normal and abnormal states. [6] For atypical clinical scenarios, a 7-day FVC or diary should be used. Equally, a 7-day diary is recommended for clinical research. [7]

Asking the patient to record micturitions and symptoms for a period of days provides invaluable information in the assessment of voiding disorders and in the follow-up after treatment. The recording of micturition events can be in three main forms:

Micturition time chart: this records only the times of micturitions, day and night, for at least 24 hours.

Frequency volume chart (FVC): this records the volumes voided as well as the time of each micturition, day and night, for at least 24 hours.

Bladder diary: this records the times of micturitions and voided volumes, incontinence episodes, pad usage and other information such as fluid intake, the degree of urgency and the degree of incontinence.

The following measurements can be abstracted from frequency volume charts and bladder diaries:

Daytime frequency is the number of voids recorded during waking hours and includes the last void before sleep and the first void after waking and rising in the morning.

Nocturia is the number of voids recorded during a night's sleep; each void is preceded and followed by sleep.

Night-time frequency is the number of voids recorded from the time the individual goes to bed with the intention of going to sleep, to the time the individual wakes with the intention of rising.

24-hour frequency is the total number of daytime voids and episodes of nocturia during a specified 24 hours period.

24-hour production is measured by collecting all urine for 24 hours; this is usually commenced after the first void produced after rising in the morning and is completed by including the first void on rising the following morning.

Polyuria is defined as the measured production of more than 2.8 litres of urine in 24 hours in adults. It may be useful to look at output over shorter time frames.

Nocturnal urine volume is defined as the total volume of urine passed between the time the individual goes to bed with the intention of sleeping and the time of waking with the intention of rising. Therefore, it excludes the last void before going to bed but includes the first void after rising in the morning.

Nocturnal polyuria is present when an increased proportion of the 24-hour output occurs at night (normally during the 8 hours whilst the patient is in bed). The night time urine output excludes the last void before sleep but includes the first void of the morning. The normal range of nocturnal urine production differs with age and the normal ranges remain to be defined. Therefore, nocturnal polyuria is present when greater than 20% (young adults) to 33% (over 65 years) is produced at night. Hence the precise definition is dependent on age.

Average volume voided is the mean volume of urine passed in each void. This is calculated by dividing total voided volume by number of voids.

Normalised micturition frequency is a more meaningful way of expressing voided volume. This is defined as the number of micturitions required to pass 1 litre of urine, and is calculated by dividing 1000 ml by average volume voided. This is a more specific measure of bladder function than micturition frequency, since it takes into account behavioural, dietary and pharmacological factors that affect urine volume.

Maximum voided volume is the largest volume of urine voided during a single micturition and is determined either from the frequency/volume chart or bladder diary.

Incontinence Episode Frequency is the number of episodes of accidental urine leakage that occur over a specified period (e.g. 24 hours).

Urgency is the complaint of a sudden compelling desire to pass urine, which is difficult to defer, and which leads to a fear of incontinence. The impact of this symptom may be derived from a bladder diary by recording episodes of urgency, episodes of urgency leading to incontinence and severity of urgency (e.g. using a daily visual analogue scale).

Pad usage is the number of pads used over a specified period (e.g. 24 hours).

RECOMMENDATIONS

1. Whilst suggestive of LUTD, LUTS cannot be used to make a definitive diagnosis; they may also indicate pathologies other than LUTD. (Grade D)
2. Signs suggestive of LUTD are observed by the physician including simple means to verify symptoms and quantify them. (Grade D)
3. Urinary or faecal incontinence should be further described by specifying relevant factors such as type, frequency, severity, precipitating factors, social impact, effect on hygiene and quality of life, the measures used to contain the leakage and whether or not the individual seeks or desires help. (Grade D)

FUTURE RESEARCH

1. Standardization of the 'definition of symptoms' and the 'measurement of frequency and severity' are essential for patient care and research.
2. Recognition and resolution of the differences in common language usage and scientific utilization of terms should continue (e.g. common use of 'urge to void' and the 'desire to void' versus the ICS terminology of "urgency"). In addition, continued research into the development of accurate measures to objectify subjective symptoms such as "urgency".
3. Resolution of the differences in the ICS and NIH definitions (in addition to other regulatory agencies) is essential for communicating data with respect to patient care, research, and treatment outcomes.
4. Development of symptom assessment tools (questionnaires) to improve the diagnostic accuracy of lower urinary tract symptoms.

5. Post void residual urine volume

Post void residual (PVR) is the volume of urine remaining in the bladder following a representative void. PVR measurement can be accomplished within a few minutes of voiding either by catheterisation or by microprocessor calculation of bladder volume using a portable ultrasound scanner. Several studies have compared volumes with portable ultrasound scanners versus catheterisation and found portable scanners to be 85-94% accurate. [8-12] Two studies have imaged the bladder volume after catheterisation and found the volume of urine remaining in the bladder after catheterisation accounted for most of the difference between the two measurements. [11] There are several case reports of cystic pelvic pathology and pregnancy resulting in false positive elevated PVR on ultrasound.[13-14]

Since PVR may vary, one measurement of PVR may not be sufficient. [15] Non-representative PVR is particularly common if the patient's bladder was not sufficiently full to yield an urge to void. Special consideration is required in male patients with bladder outlet obstruction, in neurogenic patients who demonstrate combined disorders of storage and emptying, and preoperatively in female patients being considered for incontinence surgery. [16]

Review of the literature fails to show an evidenced-based specific maximum PVR that is considered normal, nor is there a minimal PVR that is considered abnormal. The amount of residual urine that precludes treatment by various therapies has also not been determined.

The AHCPR guidelines state that, in general, a PVR less than 50ml is considered adequate bladder emptying and over 200ml is considered inadequate emptying. [19-20] Special consideration is required in subgroups of patients with the potential for decreased emptying. (**Table 1**) Additional information on this topic is presented by the committee on imaging.

Table 1. Patient sub-groups with increased potential for impaired bladder emptying

1. Symptoms of decreased bladder emptying / abdominal distension
2. Male patients with symptoms of bladder outlet obstruction
3. Neurogenic patients (peripheral denervation, detrusor sphincter dyssynergia)
4. History of present or failed anti-cholinergic therapy.
5. Suspected detrusor hyperreflexia with impaired contractility (DHIC)
6. Post-operative pelvic surgery, especially continence surgery (female)
7. Poor historian (frail elderly or paediatric).

RECOMMENDATIONS

1. Varying degrees of decreased bladder emptying or urinary retention may be a cause of LUTS that are associated with symptoms of decreased urinary storage. The decision to perform a PVR in disease specific sub-groups of patients should be based on an association of the condition with poor bladder emptying, whereas in individual patients this decision may be based on symptoms or physical findings. (GradeD)
2. Patients who present with storage specific symptoms, with normal sensation and no complaints of decreased bladder emptying, and no anatomical, neurological, organ-specific, or co-morbid risk factors for retention may be assessed for bladder emptying by history and physical examination alone, depending on the potential morbidity of the failure to diagnose and the nature of the intended therapy. (Grade D)
3. A PVR should be performed in patients where decreased bladder emptying is suspected, especially if treatments that decrease bladder contractility or increase outlet resistance are being considered. (Grade D)

FUTURE RESEARCH

1. Development of more specific indications for PVR testing for diagnosis and prior to instituting therapy based on history, physical examination, and disease specific findings.
2. Further development of low cost, minimally invasive, and accurate means of measurement of PVR that do not require catheterisation.

6. URINALYSIS IN THE EVALUATION OF THE PATIENT WITH LUTS

"The urinalysis is a fundamental test that should be performed in all urological patients. Although in many instances a simple dipstick urinalysis provides the necessary information, a complete urinalysis includes both chemical and microscopic analysis". [17]

In relation to urinary incontinence, dipstick urinalysis is not a diagnostic test, but a screening test, important in order to detect haematuria, glucosuria, pyuria and bacteriuria. Haematuria can indicate important pathology such as urothelial carcinoma in situ, leading to lower urinary tract storage symptoms including incontinence. [18] Glucosuria is relevant, as a potential indicator of diabetes mellitus. This can cause symptoms via several mechanisms including polyuria secondary to osmotic diuresis, peripheral autonomic neuropathy affecting bladder innervation leading to impaired bladder emptying and chronic urinary retention and finally due to increased risk of urinary tract infection (UTI), directly related to the glucosuria and as a sequel to impaired bladder emptying.

Pyuria and bacteriuria, detected from urinary dipstick leukocyte esterase and nitrite tests respectively, are important signs of urinary tract infection. The specificity and sensitivity of these latter tests for UTI is increased when used together compared to either individual test. [19-20] Even in the absence of controlled studies, there is general expert consensus that the benefits of urinalysis clearly outweigh the costs involved, although the use of urinalysis should always be associated with prognostic significance. [21] A positive dipstick urinalysis will prompt formal urine microscopy and culture to detect UTI prior to antibiotic treatment and/or the use of additional tests such as endoscopy and urinary tract imaging. In the evaluation of urinary incontinence and lower urinary tract symptoms, the value of urinalysis can be illustrated by the finding that 60% of women with stable bladder will develop detrusor overactivity at the time of UTI.

The importance of urinalysis in the basic assessment of patients with urinary incontinence and lower urinary tract symptoms is not dependent on gender, age or aetiology. Indeed, it has been recommended in the evaluation of geriatric patients including nursing home residents who are incontinent, [22, 23] in peri- and postmenopausal women, [24] and in older women reporting urinary incontinence. [25] In the latter context, it has been suggested that significant urine samples can even be obtained from disposable diapers in elderly incontinent women. [26] A Norwegian survey of general practitioners' management of female urinary incontinence suggested that urinalysis is the most frequently performed test (73%) and is far more frequent than gynaecological examination (54%). [27] Another survey proposed that urinalysis is one of the three-part assessment of urinary incontinence together with patient history and physical examination [28]

The clinical relevance of asymptomatic bacteriuria (without pyuria) and pyuria (without bacteriuria) in the elderly is controversial, and many suggest these conditions do not deserve any treatment. [29, 30]

RECOMMENDATION

1. It is considered standard to perform a urinalysis either by using a dipstick test or examining the spun sediment. (Grade D)
2. If a dipstick test is used, it is recommended that a "multi-property" strip that includes fields for haematuria, glucose, leukocyte esterase and nitrite tests be chosen. (Grade D)
3. Additional tests available on urine dipstick strips, such a protein, bilirubin, ketones and pH, may be helpful in the broader medical management of patients. However, they are not essential in the context of evaluation of the patient with urinary incontinence or lower urinary tract symptoms. (Grade D)

FUTURE RESEARCH

1. Determine the role of urinalysis as a screening test in various incontinent populations.
2. Determine the prognostic significance of urinalysis in urinary incontinence.
3. Determine the relevance of asymptomatic bacteriuria without pyuria, and pyuria without bacteriuria, in elderly women.

II. THE FEMALE PATIENT

1. General Medical History

The general history should include questions relevant to precipitating and aggravating factors of urinary loss, time of onset and duration of symptoms, and degree of bother. Acute symptoms may be further defined by documenting patterns of fluid intake and output, acute infection, recent surgery or trauma. Chronic symptoms may be further defined by eliciting a history of congenital abnormalities, neurological disease, relevant surgery or general health. Information must be obtained on medications with known or possible effects on the lower urinary tract. The general history should also include assessment of menstrual, obstetric, sexual and bowel function.

2. Urinary symptoms

Women with urinary incontinence may have had the condition for many years before presenting; they are often embarrassed in disclosing their condition and are likely to have undertaken significant adaptations to their lifestyle to ameliorate their symptoms. [31] In establishing the history the opportunity should be taken not only to describe symptoms, but also their progression, impact on lifestyle and possible risk factors. Multiple symptoms are commonly reported, [32] and during the history it is important to define the most troublesome symptoms and the patient's expectations from treatment. Structured condition specific questionnaires may be used, [33] and may be either clinician or self-administered. Questionnaires may facilitate disclosure of embarrassing symptoms, ensure that symptoms are not omitted, and standardise information thereby aiding audit and research.

Harvey & Versi evaluated the symptom and sign of stress incontinence in predicting the presence of urodynamic stress incontinence, using the results of a MEDLINE search for 'urinary incontinence', 'urodynamic' or 'urodynamics'. [34] Of 42 articles evaluated, 12 yielded analysable data. The isolated symptom of stress incontinence had a positive predictive value (PPV) of 56% for the diagnosis of pure urodynamic stress incontinence (USI) and 79% for USI with other abnormalities. The PPV for stress incontinence with other symptoms was 77% for USI with or without other abnormalities. A positive cough test had a PPV of 55% for the diagnosis of pure USI and 91% for USI with other abnormalities. They concluded that in isolation, either symptom or sign were poor predictors of USI, although in combination prediction may be more promising. [34]

Horbach reviewed the literature regarding the reliability of stress symptoms in predicting USI; PPV values ranged from 64% to 90%. [35] Summitt et al reported that 53% to 71% of women with detrusor overactivity (DO) gave similar histories to those with pure USI. [36] The PPV of a history of pure urge incontinence may be as low as 37%, [37] and overactive bladder symptoms (OAB) only 54%, [38] in the diagnosis of DO. It is however of interest to note that in a secondary analysis of data from a drug study in patients with predominant stress incontinence, the main determinant of concurrent urge symptoms was not the pathophysiological condition present (i.e. the presence of concurrent detrusor overactivity) but the severity of incontinence. [39]

Martin et al, have recently reported a systematic review of methods of assessing urinary incontinence. [40] From an electronic search of MEDLINE, EMBASE and CINAHL between 1966 and 2002 they identified 6009 individual papers; only 197

were relevant, and of these 121 reached the standards required of their report. Only a limited number could be combined and synthesised, although they were able to conclude that a large proportion of women with urodynamic stress incontinence can be correctly diagnosed in primary care from clinical history alone (sensitivity 0.92; specificity 0.56). The value of validated scales and pad tests could not be determined from the available data. The urinary diary appears to be the most cost effective of tests that might be used alongside clinical history within the primary care setting (sensitivity 0.88; specificity 0.82). [40]

The clinical practice guidelines published by the Agency for Health Care Policy and Research (AHCPR) [41, 42] recommended considering surgery without referral for urodynamic testing for patients with symptoms of pure stress urinary loss and a voiding history and results of physical examination suggestive of pure hypermobility urodynamic stress incontinence that includes the following:

- Urine loss occurs only with physical exertion (history and stress test)
- Voiding habits are normal (<8 episodes per day and <2 episodes per night).
- There are no neurological signs or history and no abnormal neurological findings.
- Patient has no history of anti-incontinence or radical pelvic surgery.
- Pelvic examination documents hypermobility of the urethra and bladder neck, pliable and compliant vaginal wall, and adequate vaginal capacity.
- Post void residual volume is normal.
- Patient is not pregnant.

In a study of 950 women with urinary incontinence and without advanced prolapse, Weidner et al concluded that the symptom of stress incontinence alone was not of sufficient predictive value to serve as a basis for surgical management, the AHCPR guideline improved predictive value, albeit only for a small subset of patients. [32]

In a study based on decision analysis, Weber et al reported a cure rate of 96% from initial and secondary treatment, following both basic office assessment and urodynamic investigation. [43] Both investigative strategies had similar mean costs, the lower initial outlay of basic assessment being balanced increased costs in those failing initial interventions. Under baseline assumptions, the cost per additional cure using the urodynamic strategy was $3847, and the authors concluded that their findings did not support the routine use of urodynamics prior to surgery in women with over 80% likelihood of having urodynamic stress incontinence. [43]

Voiding and post-micturition symptoms are common in the female, yet they correlate poorly with urodynamic evidence of voiding dysfunction. In a study of voiding symptoms in 600 women, Stanton et al reported voiding symptoms to be the main complaint in only 50 (8%), although a further 145 (24%) reported one or more voiding symptoms on direct questioning. [44] Where there were no voiding symptoms even on direct questioning, 97% of women showed entirely normal urodynamics, although even where voiding symptoms were volunteered or reported on direct questioning, still 63% and 32% of women respectively showed normal voiding parameters. [44] Laor and Hilton showed that single voiding or post-micturition symptoms had a poor positive predictive value (PPV) for urodynamic evidence of voiding dysfunction. [45] Where patients reported any one, two, three or even four of the symptoms of hesitancy, strain voiding, poor flow, intermittent flow, incomplete bladder emptying, or post-micturition dribbling, the PPV for voiding dysfunction was less than 30%; even where patients reported five or six of these symptoms the PPV was no better than 60%. [45]

3. Other symptoms of pelvic floor dysfunction

a) Prolapse symptoms

The feeling of a lump ("something coming down"), low backache, heaviness, dragging sensation, or the need to digitally replace the prolapse in order to defaecate or micturate, are amongst the symptoms women may describe who have a prolapse. Prolapse symptoms may be associated with urinary storage or emptying symptoms. Outlet symptoms as diverse as genuine or occult stress incontinence or obstruction, and bladder overactivity or underactivity may have a common aetiology, exist as a cause or effect, or coexist with lower urinary tract dysfunction.

b) Bowel symptoms

In addition to urinary complaints, women may have symptoms relating to bowel function, sexual function, and pelvic organ prolapse (POP). Jackson et al. evaluated 247 women with either UI or POP. Thirty

one percent of women with UI and 7% with POP had concurrent anal incontinence (AI). [46] In a report from Sweden, 62% of 21 consecutive women undergoing a Burch colposuspension for urodynamic stress urinary incontinence had concurrent faecal incontinence. [47] In a Norwegian study of women presenting with a complaint of urinary incontinence (UI), 38% of the women were found to have significant prolapse and 19% reported faecal incontinence. [48] All these aspects of the pelvic floor and pelvic floor function must be included to plan a comprehensive treatment strategy.

c) Symptoms associated with sexual dysfunction

Dyspareunia, vaginal dryness and coital incontinence are amongst the symptoms women may describe during or after intercourse. These various symptoms are reported by one third to two thirds of women with stress incontinence, and 68% report their sex life to be spoilt by their urinary symptoms. [49] Symptoms of sexual dysfunction should be described as fully as possible; it is helpful to define urine leakage as occurring during arousal, on penetration, during intercourse, or at orgasm (*vide supra*). [3]

4. PHYSICAL EXAMINATION

a) General examination

There are few data linking bladder, bowel, or sexual function to variations in examination findings of women seeking routine gynaecological care. Similarly data on women with complaints of urinary incontinence do not include detailed, specific information about their pelvic examinations.

Physical examination is essential in the assessment of all women with lower urinary tract dysfunction. Height and weight should be recorded so that body mass index can be calculated (Kg/M^2); this has recently been shown to be a significant risk factor for incontinence. [50]

Neurological examination should be performed, with attention to the sacral neuronal pathways. Assessment of gait, abduction and dorsiflexion of the toes (S3) and sensory innervation to the labia minora (L1-L2), sole and lateral aspect of the foot (S1), posterior aspects of the thigh (S2), and perineum (S3) and cutaneous sacral reflexes (bulbo-cavernosus and anal reflexes) may be assessed. A rectal examination will provide a subjective assessment of resting and voluntary anal tone (S2-S4). For patients with possible neurogenic lower urinary tract dysfunction, a more extensive neurological examination is needed (*vide infra*).

The agitated patient with urgency and frequency might have a behavioural cause and those who are clinically depressed have a less successful response to surgical treatment for stress urinary incontinence. A mini-mental state assessment will assess cognitive function, and is particularly helpful in the elderly (*vide infra*). Restriction in mobility may lead to functional incontinence and a lack of hand dexterity may preclude self-catheterisation and the use of prosthetic continence devices.

b) Abdominal examination

Scars from previous surgery should be noted. Increased abdominal striae may be found in association with other markers of abnormal collagen metabolism, and are more likely in patients with prolapse and stress incontinence. [51]

An attempt should be made to palpate the kidneys, particularly where a voiding dysfunction or neurogenic bladder dysfunction are suspected. A distended bladder may be identified by abdominal palpation or by suprapubic percussion. In one study designed to look at the clinical utility of basic assessment in elderly women, palpable enlargement indicated a post-void residual volume of at least 300ml. [52]

c) Perineal/genital inspection

Inspection of the vulva and perineum allows a description of the skin and, for example, the presence of any abnormal anatomical features, of atrophy or excoriation, and erythema due to incontinence and the wearing of pads.

The patient should be asked to cough and strain to demonstrate stress urinary incontinence and to observe urethral length, position, and mobility, and reflex contraction of the external anal sphincter. Howard and associates tested vesical neck descent during cough and Valsalva manoeuvre. [52] They found incontinent women have similar vesical neck mobility with both manoeuvres, whereas continent women have less vesical neck descent with a cough than with Valsalva.

THE CLINICAL SIGN OF URINARY INCONTINENCE is defined as urine leakage seen during examination; this may be urethral or extra-urethral.

STRESS URINARY INCONTINENCE is the observation of involuntary leakage from the urethra, synchronous with exertion/effort, or sneezing or coughing. If stress urinary incontinence is suspected, provocative stress testing (direct visualization) can be performed by having the individual relax and then cough vigorously while the examiner observes for urine loss

from the urethra. Optimally these tests should be done when the patient's bladder is full, but they should not be performed when the patient has a precipitant urge to void. The test is usually performed initially in the lithotomy position, although if no leakage is observed, it should be repeated in the standing position, since the yield is increased when the test is repeated in the upright position. Coughing may induce a detrusor contraction, hence the sign of stress incontinence may only be a reliable indication of urodynamic stress incontinence when leakage occurs synchronously with the first cough and stops at the end of that cough. It has however been shown that following an increase in intra-abdominal pressure, and the immediate fall in urethral closure pressure, there follows a 'refractory period' of several seconds during which the urethra maintains a lower pressure than at rest. [54] The extent of pressure loss, and the time to recovery are both less in stress continent then stress incontinent women. [55] If further increases in intra-abdominal pressure occur during this time, stress leakage is more likely to be demonstrated after a series of coughs than following a single cough. [55]

Bonney's original stress test was performed to demonstrate urinary leakage during coughing. [56] Subsequent modifications of the test require support of the urethra-vesical junction during coughing in women who leak during a stress test. These modifications are not reliable in selecting a surgical procedure or in predicting cure.

EXTRA-URETHRAL INCONTINENCE is defined as the observation of urine leakage through channels other than the urethra. This may result from congenital abnormality such as ectopic ureteric opening, or from urogenital fistula.

d) Urethro-vesical junction (bladder neck) mobility

Urethro-vesical junction (bladder neck) mobility should be assessed in all women with urinary incontinence. It is generally felt that women with urodynamic incontinence fall into several categories based on assessment of urethral support and urethral function. The choice of therapy may be affected by the assessment of bladder neck mobility. One method of assessing bladder neck mobility is by visual inspection. When the patient is in lithotomy position, the urethral meatus is horizontal to the floor in a woman with good bladder neck support. When she increases intra-abdominal pressure you can observe for posterior rotation of the anterior vagina and deflection of the meatus toward the ceiling, both signs of some loss of support. You may ask her to contract the pelvic muscles to determine if urethral support improves with muscle contraction, a sign pelvic floor training may be therapeutic.

The cotton swab or Q-tip test is a simple out-patient procedure to quantify bladder neck mobility. [57] A sterile, lubricated cotton or *Dacron* swab (Q-tip) is inserted into the urethra until it lies just within the urethra-vesical junction. Using a goniometer, the angle circumscribed by the distal end of the swab is measured relative to the horizontal while the woman is performing a maximum Valsalva effort. Urethro-vesical junction hypermobility is defined by a maximum strain axis exceeding +30 degrees from the horizontal.

There are no published reports about the reproducibility of the cotton swab test for measuring bladder neck hypermobility, despite its widespread clinical application in the evaluation and management of women with urinary incontinence. The validity of this test for diagnosing stress urinary incontinence was not systematically evaluated until 15 years after its introduction. At that time, investigators found that a sizable minority of women with the urodynamic diagnosis of stress incontinence did not have a positive cotton swab test result [57] (considered a straining angle >30°) and that many women with a positive cotton swab test result did not have stress urinary incontinence on urodynamic testing. The test was not able to distinguish women with stress incontinence from continent control subjects, [58, 59] or women with stress incontinence from those with other urologic disorders. [60] The cotton swab test is now used primarily to assess results of incontinence surgery or to determine whether the degree of urethral hypermobility may influence treatment outcomes. Although the test is simple to perform, the insertion of the small cotton swab may be uncomfortable for some women. Investigators have explored other methods to assess hypermobility, including the POP-Q anatomic evaluation system and ultrasonography. In one study, the correlation coefficient between the cotton swab straining angle and point Aa (the urethro-vesical junction) on the POP-Q system was 0.47. [61] However, the cotton swab test was positive in 95% of patients with stage II prolapse at point Aa and in 100% of patients with stages III and IV prolapse at point Aa, which suggests that the test may be unnecessary in patients with stage II or greater prolapse at point Aa. Ultrasonography can be used to measure the angle between the urethra and an axis corresponding to the pubic symphysis, the ure-

thra, the bladder base, and the position of the internal urethral meatus. Other tests to document bladder neck mobility are used, including bead-chain cystourethrography, and videocystourethrography. The chapter on imaging of the urinary tract addresses the place of these techniques.

e) Vaginal examination

Presently there are few scientific data documenting the parameters of a normal pelvic examination in women of various ages and with various obstetrical histories. The components of the examination have not been universally agreed upon. It seems intuitive the examination should include an assessment of the bony architecture, pelvic floor muscle tone and muscle mass, connective tissue support, the epithelial lining of the vagina, the size, location, and mobility of the uterus, the adnexal structures, and innervation of the pelvic floor structures.

It is important to establish the oestrogen status as oestrogen receptors are present within the lower urinary tract, [62] and are shown to influence cell proliferation. [62] Women with oestrogen deficiency may complain of urgency and frequency and recurrent urinary tract infections may develop because of loss of urethral mucosal coaptation. In women of reproductive age symptoms may vary with the menstrual cycle. [64]

The well oestrogenised vagina has a thickened epithelium, with transverse rugae in its lower two-thirds. The poorly-oestrogenised vagina has a thinned epithelium with loss of transverse rugae. [65] A number of authors have shown that vaginal pH levels are generally 5 or less in women with no infection and other definitive signs of good oestrogen effect. The use of a pH indicator paper may help you evaluate the oestrogen status in women with no vaginal is infection. [66] The appearance of vaginal discharge is charge may suggest a vaginal infection; urine within the vagina suggests genitourinary fistula, hypospadias or ectopic ureter.

Bimanual examination is performed to determine the size of the uterus and of the ovaries. Some women have co-existent pelvic disease which may require attention in addition to the urinary incontinence. When hysterectomy or oophorectomy is indicated, there is no adverse effect on surgical success with a colposuspension procedure. Pelvic masses are rarely the cause of urinary incontinence, and rarely does hysterectomy by itself relieve incontinence.

Urethral diverticula are occasionally congenital but most are acquired. They may have either a simple or complex sacculation. Many patients with urethral diverticula are asymptomatic and need no treatment. Symptomatic patients report recurrent cystitis, frequency, dysuria, dyspareunia, urinary incontinence and voiding difficulties. On clinical examination a sub-urethral mass may be palpable; the urethra is usually tender; and, if the sacculation communicates with the urethra, it may be possible to express a purulent exudate from the urethra. Occasionally, a stone may develop within the diverticulum. [67]

5. Pelvic organ prolapse

The anterior, superior, and posterior segments of the vagina should be examined for pelvic organ prolapse. The examiner may use a mirror to demonstrate the findings to the patient; she can then confirm that the examiner has identified the extent of prolapse that she experiences. If the patient indicates that she normally has a greater amount of prolapse that you presently see, provocative manoeuvres which normally are associated with her symptoms may be undertaken, and the examination repeated while the patient is standing.

Several systems for the description and classification of prolapse have been described. This may be quantified descriptively as slight, moderate, marked, [68] or first, second and third degree, or objectively using the Baden and Walker halfway method, [69] or the International Continence Society Pelvic Organ Prolapse Quantification (ICS POP-Q), [70] or modified POP-Q. [71] In the latter, using the introitus as the threshold, six specific vaginal sites and the vaginal length are assessed using centimetres of measurement from the introitus. In addition, the lengths of the genital hiatus and perineal body are measured in centimetres. **Figure 1** demonstrates the summary diagram of this quantitative system.

The definitions given below are simplified versions of the definitions in the ICS report. [70]

Pelvic organ prolapse is defined as the descent of one or more of anterior vaginal wall, posterior vaginal wall, and apex of the vagina (cervix/uterus) or vault (cuff) after hysterectomy.

> **Anterior vaginal wall prolapse** is defined as descent of the anterior vagina so that the urethra-vesical junction (a point 3cm proximal to the external urinary meatus) or any anterior point proximal to this is less than 3cm above the plane of the hymen.

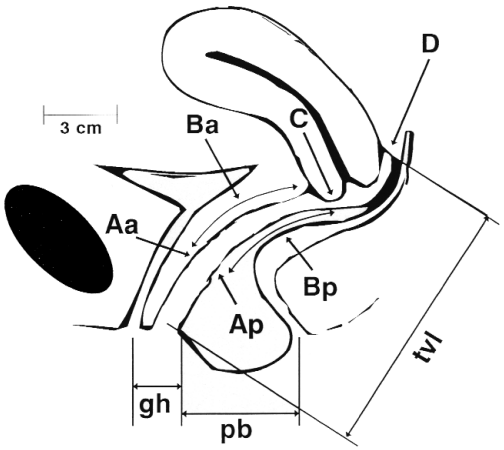

Figure 1. ICS POP-Q. Six sites (points Aa, Ba, C, D, Bp, and Ap), genital hiatus (gh), perineal body (pb), and total vaginal length (tvl)used for pelvic organ support quantitation.

The well-supported anterior vaginal wall should not cross the longitudinal axis of the vaginal canal. [72] Hypermobility of the urethra-vesical junction is demonstrated by having the patient perform a maximum Valsalva effort. In women with hypermobility the increase in intra-abdominal pressure causes descent of the urethra-vesical junction (bladder neck). On vaginal examination there may be loss of the transverse crease between the lower and middle thirds of the anterior vaginal wall and descent of the anterior vaginal wall.

Anterolateral protrusion into the vaginal canal may represent unilateral or bilateral detachment of the pubocervical fascia along the anterolateral vagina sulcus from its attachment to the arcus tendineus fascia pelvis (white line). [73] Central protrusions of the anterior vaginal wall may represent defects in the pubocervical fascia below the trigone and base of the bladder. Advanced prolapse of the upper anterior vaginal wall may obstruct a well-supported bladder neck.

> **PROLAPSE OF THE APICAL SEGMENT OF THE VAGINA** is defined as any descent of the vaginal cuff scar (after hysterectomy) or cervix, below a point which is 2cm less than the total vaginal length above the plane of the hymen.

Descent of the cervix or of the vaginal apex following hysterectomy, below the level of the ischial spines is evidence of a defective vaginal suspension mechanism. In some women, the intravaginal portion of the cervix may become elongated and cause the cervix to extend into the lower vaginal canal, simulating prolapse; however the fundus may have good support. In other women the uterus may prolapse fully outside the hymen as uterine procidentia. Following hysterectomy the vaginal cuff may be well supported or may prolapse fully outside the hymen along with other vaginal segments.

> **POSTERIOR VAGINAL WALL PROLAPSE** is defined as any descent of the posterior vaginal wall so that a midline point on the posterior vaginal wall 3cm above the level of the hymen or any posterior point proximal to this, less than 3cm above the plane of the hymen.

The well-supported posterior vaginal wall should not cross the longitudinal axis of the vaginal canal. Posterior protrusions into the vaginal canal are most commonly caused by defects in the recto-vaginal fascia allowing protrusions of the small bowel (enterocoele) and/or rectum (rectocele). Normally, the anterior vaginal wall lies upon the posterior vaginal wall. Therefore, protrusions of the posterior vaginal wall can affect the function of the urethra and bladder which lie upon the anterior vaginal wall. For example, distal loss of support in the posterior segment may result in a bulge which compresses the urethra and affects voiding.

As with most new systems, clinicians and researchers have mixed opinions regarding this system. Excellent inter- and intra-observer reliability has been established, [15, 74-77] although patient position may affect reproducibility in that the degree of pelvic organ prolapse was higher when women were examined in a birthing chair at a 45° angle rather than in dorsal lithotomy. [78] This system has been widely adopted for pelvic organ prolapse researchers. In addition to collecting specific centimetre measures, an ordinal stage (0-IV) can be assigned.

Absence of prolapse is categorised as stage 0 support; prolapse can be staged from stage I to stage IV. The clinical utility of such a classification might be questioned, since clearly some degree of descent is the norm especially in a parous population. In a study of 477 women attending for annual gynaecological examination, Swift et al found that the average number of positive responses to a 7-question prolapse questionnaire was 0.27 in patients with stage 0 prolapse, 0.55 for stage I, 0.77 for stage II, and 2.1 for stage III. They concluded that women with prolapse with the leading edge beyond the hymenal ring had a significantly increased likelihood of having symptoms. [79] In a general population of Swedish women ages 20-59, the prevalence of prolapse was

found to be 31%, whereas only 2% of all women had a prolapse that reached the introitus. [80] It might seem more reasonable therefore to define prolapse not on the basis of any finding greater than stage 0, but on the basis of findings with a significant likelihood of being associated with symptoms.

Urinary incontinence and pelvic organ prolapse are separate clinical entities which often coexist. [46] Significant protrusions of the vagina can obstruct voiding and defecation. Surgical repair of one pelvic support defect without repair of concurrent asymptomatic pelvic support defects appears to predispose to accentuation of unrepaired defects and new symptoms. [47, 81-83] Women with pelvic organ prolapse may have to reduce their prolapse in order to void. Women with pelvic organ prolapse and a large PVR should be evaluated for voiding phase dysfunction (e.g., outlet obstruction, detrusor hypotonia).

Although anatomy can be measured and assessed accurately, reproducibly and reliably, the relationship of these anatomic findings with functional abnormalities is not well understood. For example, support abnormalities in the anterior vaginal wall are common in vaginally parous women; however, stress urinary incontinence is not always associated with this anatomic alteration. Likewise, distal posterior vaginal wall support abnormalities may exist with or without defecation abnormalities. The important relationships between anatomy and function are one of the most pressing research needs in the field of physical examination for women with pelvic organ prolapse.

Other important research needs include the development of clinically relevant ordinal staging that more appropriately separates meaningful prolapse from anatomic changes following vaginal delivery. Such revised staging would allow a meaningful dialog about the appropriate surgical indications for pelvic organ prolapse and development of clinically relevant anatomic outcome measures.

6. Rectal examination

Digital rectal examination allows the description of observed and palpable anatomical abnormalities and is the easiest method of assessing pelvic floor muscle function in children and men. In addition, rectal examination is essential in children with urinary incontinence to rule out faecal impaction. In all women a digital rectal examination is also performed to assess sphincter tone (both resting and active) and to detect faecal impaction or a rectal mass.

7. Additional basic evaluation

a) Pad tests

The objective of pad testing is to quantify the volume of urine lost by weighing a perineal pad before and after some type of leakage provocation. This test has also been used in an attempt to distinguish continent from incontinent women. Pad tests can be divided into short-term tests, usually performed under standardized office conditions, and long-term tests, usually performed at home for 24–48 hours. Pad tests are generally performed with a full bladder or with a fixed known volume of saline instilled bladder before beginning the series of exercises. A pad weight gain >1 g is considered positive for a 1-hour test, and a pad weight gain >4 g is positive for a 24-hour test. There is wide variation in the pad weight gain in incontinent women participating in clinical trials. For example, in a study assessing the effectiveness of pelvic muscle exercises, the mean pad weight gain during a standardized 1-hour test was 45.4g before treatment, with a standard deviation of 60.9gm. A 1-hour pad test is frequently used in clinical trials. Although some studies have found high test-retest correlations in pad tests, [84, 85] other studies have reported low inter-subject and intra-subject reliability. [86-90] Traditional pad testing may be negative in women with mild leakage; an alternative "paper towel test" was shown to be a simple and reliable measure of cough-related urine loss typical of mild stress incontinence. [91] Long-term tests are more reproducible. The correlation coefficient between total leakage during two 24-hour pad tests is good, at 0.66 [92] and 0.82 [93] and increased to 0.90 in one study in which two 48-hour periods were compared. There was no correlation between the leakage volume found in the 48-hour test and a standard 1-hour test.

b) Dye testing

When it has proved impossible to confirm a patient's complaint of urinary leakage, it may be appropriate to seek to confirm firstly that the reported discharge is in fact urinary, secondly that the leakage is extra-urethral rather than urethral, and thirdly to establish the site of leakage. Although other imaging techniques undoubtedly have a role in this regard, carefully conducted dye studies should be considered. Excessive vaginal discharge or the drainage of serum from a pelvic haematoma postoperatively may simulate a urinary fistula. If the fluid is in sufficient quantity to be collected, biochemical analysis of its urea content in comparison to that of urine and serum will confirm its origin. Phenazopyridine may be used

orally (200mg tds), or indigo carmine intravenously, to stain the urine and hence confirm the presence of a fistula. The identification of the site of a fistula is best carried out by the instillation of coloured dye (methylene blue or indigo carmine) into the bladder via catheter with the patient in the lithotomy position. The traditional 'three swab test' has its limitations and is not recommended; the examination is best carried out with direct inspection; multiple fistulae may be located in this way. It is important to be alert for leakage around the catheter, which may spill back into the vagina creating the impression of a fistula. It is also important to ensure that adequate distension of the bladder occurs as some fistulae do not leak at small volumes; conversely, some fistulae with an oblique track through the bladder wall may leak at small volumes, but not at capacity. If leakage of clear fluid continues after dye instillation a ureteric fistula is likely, and this is most easily confirmed by a 'two dye test', using Phenazopyridine to stain the renal urine, and methylene blue to stain bladder contents. [94]

c) Pelvic floor muscle strength

Pelvic floor muscle function: can be qualitatively defined by the tone at rest and the strength of a voluntary or reflex contraction as strong, weak or absent or by a validated grading system (e.g. Oxford 1-5). A pelvic muscle contraction may be assessed by visual inspection, by palpation, electromyography or perineometry. Factors to be assessed include strength, duration, displacement and repeatability.

The continence mechanisms imply that integrity of the levator ani and external urethral sphincter is necessary to maintain continence. [95, 96] It is therefore important to test the contractility of these muscles. Once the patient understands how to contract the pelvic floor muscles correctly, the evaluation is carried out during a maximum contraction. [97]

Strength is defined as the maximum force or tension generated by a muscle or muscle group. [98] It reflects the power, endurance and functional status of the muscle.

Weakness is defined as failure to generate the expected force.

Fatigue is defined as failure to maintain the expected force with continued or repeated contraction. [99]

When considering methods/devices used to measure pelvic muscle strength, cost and availability should be recognized as important factors. Four methods of assessment are considered here: observation, digital palpation, perineometry and cotton swab (Q-tip) testing.

Observation - This qualitative measure can detect an in-drawing of the anus, lifting of the posterior vaginal wall and narrowing of the vaginal introitus (females); an in-drawing of the anus and slight lifting of the penis (males).

- *Advantages*: Suitable for both sexes and all age groups, where an internal evaluation may be inappropriate, inexpensive and able to detect reflex contraction with cough, and bulbo-cavernosus reflex. Observe accessory muscle activity.
- *Disadvantages*: Subjective, cannot distinguish right and left sides independently. Generally observing activity of the superficial perineal muscles, and assuming levatores are responding in a like manner, and difficult to observe when the patient is standing.

Digital palpation - Palpation of the right and left levator ani, per vagina and palpation of the perineal body.

- *Advantages:* Suitable for both sexes, inexpensive, and able to differentiate right from left. Quantitative - using modified Oxford scale or other systems. [100, 101] Able to measure strength and endurance, can detect reflex contraction with cough and patient's ability to hold contraction during a cough, and can be used when the patient is standing.
- *Disadvantages*: Subjective. Not sensitive.

Perineometer - Manometric measure of change in a vaginal/anal pressure probe. Sensitivity depends on the device.

- *Advantages*: Relatively inexpensive. Able to measure strength and endurance, quantitative, and can be used when the patient is standing.
- *Disadvantages*: Unable to distinguish right from left. Pressure changes may be caused by increase in intra-abdominal pressure, due to co-contraction of the abdominal muscles. No 'Gold Standard' device; different results with different probe sizes and materials. [102]

Cotton swab (Q-tip) test Downward, posterior movement of stem (measured on a goniometer) is dependent on the strength of the contraction of the pubococcygeus muscles, and mobility of the urethra. [103]

- *Advantages:* Inexpensive and can measure strength and endurance.

- *Disadvantages*: Lacks sensitivity and specificity, invasive, and is can be performed in females only.

The information learned from assessment of pelvic floor muscle strength has the following practical applications:

1 The patient has good pelvic floor muscles that need skill training to help maintain continence. DeLancey and associates have described 'knack' teaching. [104, 105]

2 The patient has weak muscles that are capable of contracting but need strength and skill training. An effective exercise program should increase resting tone (Type I fibres) as well as improve the ability of fast twitch (Type II) fibres to respond to increases in intra-abdominal pressure. [106]

The patient has no perceptible contractions and needs further evaluation (EMG, MRI, neurophysiologic testing) or passive contraction therapy i.e., functional electro stimulation.

RECOMMENDATIONS

1 Although the value of individual urinary symptoms and symptom complexes in predicting the underlying abnormality of lower urinary tract function is not high, a significant proportion of women with stress incontinence can be correctly diagnosed from basic evaluation only. Grade C

2. The frequency/volume chart or urinary diary is the most effective additional test for use alongside basic evaluation in primary or secondary care. Grade C

3. In assessing patients with urinary or faecal incontinence, cognisance should be taken of all aspects of pelvic floor dysfunction, i.e. urinary, bowel, prolapse, and sexual function. Grade D

4. In describing patients with pelvic organ prolapse, one of the several systems available for classification and quantification of prolapse should be employed. Grade D

FUTURE RESEARCH

1. Correlation of symptoms and physical findings with urodynamic and colorectal investigations, and both basic and complex evaluations with treatment outcomes.
2. The development of a clinically relevant ordinal staging that meaningfully separates significant from insignificant pelvic organ prolapse.
3. Impact of surgical interventions for incontinence on pelvic organ support, and for pelvic organ prolapse on continence mechanisms.

III. THE MALE PATIENT

1. Characteristics of male incontinence?

In the male patients, lower urinary tract dysfunction, and obstruction from benign prostatic enlargement presents a multi-factorial paradigm for symptom aetiology.

Lower urinary tract symptoms (LUTS) in men have a significant effect on quality of life (QOL), as compared with the unaffected general population. [107]

The incidence of LUTS increases with age; both voiding and storage symptoms increase, with a more substantial increase in voiding symptoms in men compared with women after the fifth decade of life. [103] Furthermore, several epidemiological reports demonstrated that overactive bladder (OAB) syndrome also increased with age in men. [108, 109] It has been reported higher age and higher grade of obstruction in men with bladder outlet obstruction and idiopathic detrusor overactivity. [110]

In the NOBLE study, a different sex-specific pattern emerged for OAB with or without urge incontinence. [109] The prevalence of OAB with urge incontinence displays a steeper age-related increase among women than among men and the gender difference is statistically significant. In women, OAB with urge incontinence increased more than nine-fold from 2.0 % in those 18-24 years of age to 19.1% among those 65-74 years of age. In contrast, a substantial increase in prevalence of OAB with urge incontinence among men did not occur until 65 years of age, reaching 8.2% for ages 65-74 years and 10.2% for those 75 years and older. In men, OAB without urge incontinence increased approximately three-fold, from 8.5% below 45 years of age to 21.8% after 55 years of age, whereas OAB without urge incontinence gradually increased in women less than 44 years of age and reached a plateau in women over the age of 44 years. Prevalence ratios for OAB with urge incontinence and for OAB without incontinence were significantly elevated for men who self-reported with a history of prostate problems.

Thus, the evaluation of men with symptoms of OAB syndrome depends on the identification and assessment of lower urinary tract obstruction that may be a cause (in part or in entirety) of the presenting symptoms.

The aetiology of obstructive symptoms may vary, from benign prostatic hyperplasia (BPH), urethral stricture, primary bladder neck dysfunction, or abnormal voiding dynamics of detrusor. Chronic prostatic pain syndromes (e.g. non-bacterial chronic prostatitis) and other pelvic floor dysfunctions can also present with a component of symptoms compatible with OAB. In younger men, primary bladder neck dysfunction is a common cause of LUTS, with or without pelvic pain. [111] Functional abnormalities of striated sphincter relaxation may also occur in young men. [112] The complexity of the presenting symptoms and the various differential diagnoses mandate a thorough basic assessment of the lower urinary tract in men to plan optimal therapeutic intervention.

Another important issue in male patients is incontinence after transurethral resection of prostate (TURP) and radical prostatectomy. A survey in England of 5276 patients who had undergone TURP found that one-third of men (n=1759 men) who were continent before surgery reported some incontinence 3 months post TURP. [113] After radical prostatectomy, Donnellan et al reported that 6 % of men were mildly incontinent, 6 % were moderately incontinent and 4 % were severely incontinent at 1 year after surgery. [114] Carson et al. reported that incontinence occurs in 0.5 to 1.0% of all patients undergoing prostatectomy for benign disease; high rates (5 to 30%) are associated with radical prostatectomy.. [115]. Although prostatectomy has a clinically significant beneficial effect on LUTS with significantly improvements of AUA symptom index and flow rate, [116, 117] urinary leakage can have a major impact on QOL. Greater degrees of urine loss are correlated with greater bother and more significant life-style changes. [114] A Medicare survey by Fowler showed that in 1072 patients, more than half of the patients with urinary leakage considered it to be a medium or large problem. [118] In spite of these findings, many investigators have been encouraged by overall patient satisfaction with surgery and patients willingness to undergo surgery again, if faced with the same situation. [118]

In the immediate postoperative period, stress and urge incontinence is common. This has been attributed to varying degree of oedema and inflammation present in the healing prostatic urethra. The majority of men achieve continence without invasive intervention following total prostatectomy. Final continence status should be measured using self-administrated disease specific instruments at 24 months after operation.[116] And no factors (age, severity of LUTS, Gleason score, bilateral nerve sparing surgery and estimated blood loss) were identified that predicted early return of continence. [114]

Post-prostatectomy incontinence may be caused by sphincter malfunction and/or bladder dysfunction. [119, 120] In the adult male, urinary control depends on integrity of both the internal and external sphincters. During TURP, the internal sphincter mechanism is virtually destroyed, and in some cases, the external sphincter is also damaged. Thus post-prostatectomy stress incontinence may result.

In recent study of patients undergoing radical prostatectomy that specifically evaluated detrusor dysfunction, [121] de novo detrusor hypo-contractility and impaired or poor compliance, presumed to be a consequence of bladder denervation, occurred in a limited proportion of patients (28.6% and 18.4% respectively), and this bladder dysfunction resolved in the majority within 8 months. Detrusor hypocontractility and decreased bladder compliance are also pre-existing conditions in about 30% and 20% of patients.

The conditions relate to the presence of BOO, and they do not appear to be influenced by prostatectomy. Persistent detrusor overactivity after obstruction relief is probably related to concomitant sphincter deficiency and stress urinary incontinence, which increase afferent nerve activity of the proximal urethra and induce involuntary detrusor contractions. [122]

Obstruction after prostatectomy, resulting from an anastomotic stricture or residual prostatic tissue (post TUR-P), may also play an important role in the development of post-prostatectomy incontinence. Obstructing stricture often causes increase in post-void residual urine, resulting in the urinary leakage and/or a weak urinary stream. It has been reported that the anastomotic stricture treatment rates after radical prostatectomy are 16% to 33%. [123, 124]

2. General medical history

The medical history should focus on the urinary tract, previous surgical and radiation therapy history,

medical conditions and symptoms that may cause to bladder dysfunction or polyuria, familial history of prostate diseases (BPH and cancer), and a review of sexual and bowel habits. Urinary incontinence is rare in men without a history of previous trauma or prostatic or pelvic surgery; therefore, neurogenic bladder dysfunction must be considered in men with no history of surgery or trauma. A critical assessment of current medications is recommended to exclude the effects of any pharmacological agents on lower urinary tract function.

In the evaluation of the patients with post-prostatectomy incontinence, an important aspect of the history should be a description of the type and severity of incontinence and precipitating events. Severity may be determined by the number of episodes per day, the need for protection (e.g., pads, penile clamp, external catheter), and the impact of incontinence on activities of daily living. Bladder diaries and pad tests can quantify severity. The presence of other LUTS such as OAB and decreased force of urinary stream should be determined.

3. Symptom assessment

Diagnostic evaluation of men with LUTS depends on an initial estimation of subjective bother and objective data on bladder emptying. Because the occurrence of LUTS does not necessarily indicate concomitant prostate enlargement and/or obstruction, specific modalities should be used to ascertain the potential for the etiologic role of these entities. A bladder diary may be useful in almost all male patients, especially in those with OAB. Bladder diary completion provides useful evidence about the normal urinary habits of patient, including giving an estimate of bladder capacity and diurnal and nocturnal frequency, urgency and incontinence. The data obtained from the frequency-volume chart provides a strong correlation with cystometric capacities and is reasonably immune to the effect of detrusor instability in men with LUTS. [125]

In men, the American Urological Association symptom score for BPH (AUA-7) is most commonly used in North America for assessment of subjective symptoms. However, equally reproducible data can be obtained from the International Prostate Symptom Score (IPSS), International Continence Society (ICS)-BPH, and Danish Prostate Symptom Score (DAN-PSS-1) scales.?Among LUTS, urgency, nocturia, and hesitancy are most bothersome, whereas weak stream, urgency, and frequency are the most prevalent in pooled populations being evaluated for BPH. [126] Post-micturition dribbling is often provoked by an obstructing disease such as BPH or urethral stricture but can also be a symptom of a urethral diverticulum. Post-void residual urine volume and careful palpation of the genitalia are recommended to be performed in these patients.

To determine the cause of post-prostatectomy incontinence, many studies have stressed the lack of reliability of symptoms and emphasized the important role of urodynamic testing. [127, 128] Nevertheless, valuable information can be gained from a careful history with regard to incontinence, especially when related to sphincter dysfunction. The symptom of stress incontinence is highly predictive of the presence of sphincter dysfunction. Chao and Mayo found that 67 of 71 men with post-prostatectomy incontinence secondary to sphincteric dysfunction complained of the symptom of stress incontinence. [129] Similarly, Ficazzola and Nitti found 95% positive predictive value and a 100% negative predictive value for symptom of stress incontinence. [119] Urge incontinence as a predictor of bladder dysfunction dose not seem to be as valuable, and the presence of bladder dysfunction cannot be determined accurately without urodynamic testing. [119, 129]

4. Physical examination

The assessment and treatment algorithm focuses on the abdominal examination, digital rectal examination (DRE) and neurological testing of the perineum and lower extremities. In a patient suspected of neurogenic bladder, evaluation of perineal sensation and lower extremity neuromuscular function, and anal tone is important. A focused neurogenic examination should also assess the patient's general mental status and ambulatory status. The examination should also include external genitalia, location of the urethral meatus, retractability of the foreskin and evidence of congenital malformation. Abdominal palpation should be performed to evaluate bladder distension, especially in elderly incontinent men, who may have overflow leakage due to obstruction. In patients suspected of decreased bladder emptying or urinary retention, a post-void residual volume (PVR) should be measured. Patients with incontinence should be asked to cough and to perform a Valsalva manoeuvre so that the presence of stress incontinence can be ascertained.

DRE should include palpation of the prostate to assess size, symmetry and consistency of the gland

and its relation to the pelvic sidewall and the rectum. The locally advanced prostatic cancer can also produce OAB-like symptoms. DRE may exclude advanced prostatic cancer. DRE trends to underestimate the true prostatic size: if the prostate feels large by DRE, it usually also is found to be enlarged by ultrasound or other measurement technique. [130, 131] It has been reported that men with BPH with idiopathic detrusor overactivity showed significant higher incidence (54%) of intravesical protrusion of the prostate. [132] This finding suggests that intravesical protrusion may in some way increase afferent impulses from the prostate and alter the stability status of the bladder.

Incontinence combined with evacuation problems in a man often requires further investigation including urodynamics.

5. Urinalysis and urine cytology

Bladder cancer, carcinoma in situ of the bladder, urinary tract infections, urethral strictures, and bladder stones can cause OAB-like symptoms in aged men. Although haematuria or pyuria is not universally present in those conditions, urinalysis is important for rule out these diseases. A substantial proportion of older patients with chronic OAB-like symptoms have significant bacteriuria, sometimes accompanied by pyuria. In men, recent urinary tract infections were associated with OAB without urge incontinence (prevalence ration=2.9; 95% CI: 1.6-5.0) [109] Urine cytology is also recommended to male patients with haematuria and a predominance of storage symptoms, especially with history of smoking or other factors, to aid in the diagnosis of bladder carcinoma in situ and bladder cancer.

6. Measurement of the serum prostate-specific antigen (PSA)

Because prostatic cancer is one of the potential causes of LUTS or OAB in men, PSA (together with DRE) is a relatively sensitive way to exclude prostatic cancer as a diagnosis. [133, 134]

However, it is important to understand that about 25% of men with BPH have a serum PSA greater than 4 ng/ml. Because of the overlap between serum PSA values in men with BPH and those with clinically localized prostate cancer, other parameters (PSA velocity, free/total PSA ratio, complexed PSA and PSA density) will assist diagnostic specificity. [135, 136] However, in most patients, a normal DRE may be sufficient to exclude locally advanced cancer as a cause of LUTS or OAB.

7. Measurement of PVR

PVR measurement is an especially recommended test in men with symptoms suggestive of bladder outlet obstruction (BOO). A PVR measurement should be accomplished within a few minutes of voiding either by catheterization or by ultrasound. Review of the literature fails to show a specific maximum PVR this is considered normal, nor is there any documentation of the minimal PVR that is considered abnormal. The AHCPR guidelines state that, in general, a PVR less than 50ml is considered adequate bladder emptying and over 200ml is considered inadequate emptying. Since PVR may vary, one measurement of PVR may not be sufficient. [15]

It has been reported that the role of IPSS score in the assessment of BOO is questionable, and that the grade of obstruction is more related to prostate volume, PVR, and Qmax. [137] It is now well demonstrated that moderate-to-severe LUTS in men can result in urinary retention. The incidence of retention in men with untreated LUTS in community-based trials is 6.8 per 1000 during longitudinal follow-up of 4 years. [138] If only patients with moderate-to-severe symptoms are considered, the rate of retention increases to 25 per 1000. [139] Moreover, in considering men with weak urine flow, symptoms, and increased age, without urodynamic evaluation, other parameters become independently predictive of the development of acute urinary retention. In a meta-analysis of predictors of retention in pooled groups of placebo patients from clinical trials of men with LUTS undergoing active interventions (4300 patients), Roehrborn *et a*l. found prostate-specific antigen and prostate volume to be strong independent predictors of urinary retention in men followed up longitudinally in clinical trials. [131, 140] Therefore, on the basis of these trials, untreated LUTS may place the male patient at risk for potential clinical deterioration. Thus, periodical measurements of PVR are recommended in such patients.

RECOMMENDATIONS

1. Male patients differ from female patients in the presentation of LUTS. The incidence of OAB wet is lower until the 7th decade. (Grade C)
2. Stress urinary incontinence is primarily associated with surgery of the prostate in male patients. (Grade B)
3. Disorders of bladder emptying from benign prostatic enlargement should be considered before treating male patients for OAB symptoms. (Grade C)

FUTURE RESEARCH

1. Development of simple, non-invasive, cost-effective methods to determine the contribution of bladder storage and bladder emptying abnormalities in male patients.
2. Research into the relative contributions of idiopathic OAB, neurogenic OAB, and OAB symptoms secondary to bladder outlet obstruction to the symptomatic presentation in male patients.

IV. THE GERIATRIC PATIENT

The highest prevalence of incontinence in adults occurs in the elderly, but fewer than half of patients mention their incontinence to a health care provider. [141, 142] The psychosocial burden of incontinence is significant and the sequelae insidious. At first, believing that incontinence is a normal aging change, older individuals often wear pads and continue social activities. With time, incontinence causes older persons to leave their homes less and less frequently, and the decrease in physical activity causes deconditioning. Ultimately, the ensuing frailty increases the incidence of falls and depression, increasing morbidity and mortality.

Since incontinence is so under-reported, an important step in the evaluation of incontinence in the older person is to ask about bladder and bowel control in the review of systems. With urinary incontinence prevalence in population-based studies 35% of older women and 11-22% of older men, [143-145] and anal incontinence prevalence of 12%, [146] this is well justified for all older adults. As in younger adults, the basic evaluation of incontinence in older adults includes history, physical examination, urinalysis and post-void residual volume determination. [42, 147] In nursing home residents, the urinalysis may be reserved for patients with new or worsened incontinence and the post-void residual limited to women with diabetes or neurological disorders and to men. [148]

1. History

Incontinence in the older person is often due to an interaction of urinary tract pathology, pelvic floor and sphincter weakness, co-morbidities, and medications in the setting of age-related changes in the lower urinary tract. [149] Treating multiple contributing factors is more likely to result in improvement in incontinence than treating a single presumed cause. Components pertaining to the assessment of multifactorial causes of incontinence are well described in Chapter 10D, Urinary Incontinence and Bladder Dysfunction in Older Persons, Section V. Asking patients to bring in all of their medications, both prescription and over-the-counter, can often identify anticholinergic agents, alpha agonists and blockers, diuretics, caffeine, sedatives, antipsychotics, antispasmodics, and opiates, all of which can impact bladder function. [149] Enquiries about dietary habits, particularly caffeine intake, may provide an additional therapeutic approach. [150, 151]

The social history is particularly important in older individuals. Information related to financial concerns and insurance status, environmental safety, current social support including transportation, and available social resources can be particularly relevant to evaluation and treatment of incontinence. An experienced nurse or social worker can obtain this history. Assessment in the home by a nurse or occupational therapist can provide valuable information about distance to the bathroom, width of the bathroom door to allow use of walking aids or wheelchairs, height of the toilet, presence of grab bars, night-time lighting on the route to the bathroom, and need for assistive devices.

Sensory impairment is extremely common in the elderly. [152] For patients with hearing impairment, the health care provider should face the patient before speaking, and speak plainly and slightly more slowly if necessary. Speaking loudly tends to distort the sound and decrease speech comprehension, particularly for patients with hearing aids. An inexpensive amplification device with lightweight headphones can be very helpful in any practice evaluating older adults. Persons with hearing impairment may be thought to be demented if the examiner does not make appropriate accommodations during the interview.

Cognitively impaired patients can present a special challenge to obtaining an accurate history. With the patient's permission, a caregiver sitting in during the interview can be invaluable to supplement the history. Also, reducing caregiver burden may be the primary treatment goal in cases of more advanced dementia. Cognitively intact patients should be interviewed alone unless they request to have a relative or caregiver present.

2. Physical Examination

In addition to the physical examinations described in

previous sections for men and women, older patients often require a few extra assessments. Orthostatic blood pressure drop is common in the elderly, affecting about 18% in one study, and is associated with dizziness and falls, both of which can impair toileting.[153] Especially if alpha blockers or anticholinergic medications are anticipated, sitting and standing blood pressures are recommended.

An assessment of volume status can provide another basis for treatment options. Oedema is often mobilized at night when the person is supine contributing to nocturia and night time urge accidents. If the older person has lower extremity oedema, other signs of congestive heart failure should be checked, such as jugular venous distension, increased respiratory rate, inspiratory crackles or S3 gallop. More commonly the older person has venous insufficiency that could be managed with daytime compression hose, mid-afternoon elevation of the legs for 30 minutes, although clinical trial data is lacking to validate these recommendations. Another common cause of oedema is as a side effect from a medication such as a NSAID or a dihydropyridine calcium channel blocker that could be discontinued or changed to another medication.

Many older persons are surprisingly adept at hiding dementia during a routine interview. A brief mental status assessment such as the Mini-Cog can uncover cognitive impairment. [154] The Mini-Cog combines an un-cued 3-item recall with a clock-drawing test, can be administered in about 3 minutes, requires no special equipment and is relatively uninfluenced by level of education or language variations (see **Figure 2**).

Figure 2 : Mini-Cog Assessment Instrument.[154]

1. Instruct patient to remember 3 unrelated words and then to repeat the words – e.g. apple, penny, table.
2. Instruct the patient to draw the face of a clock, either on a blank sheet of paper, or on a sheet with a circle already drawn on the page. After the patient puts the numbers on the clock face, ask them to draw the hands of the clock at a specific time, e.g. 11:20. (*Correct clock includes all numbers present in correct sequence a position, hands displaying the requested time*).
3. Ask the patient to repeat the 3 previously presented words.

Interpretation:

Negative screen for dementia if all 3 items recalled after drawing clock or if 1-2 items recalled and clock correct. Positive screen if no items recalled or if 1-2 items recalled and clock is incorrect.

Mobility assessment is an important part of the evaluation of the older person. Restricted mobility can interfere with toileting and impact on continence. Causes of mobility impairment are common and include fear of falling, orthostatic hypotension or other causes of dizziness, physical deconditioning, and painful lower extremity conditions such as osteoarthritis. A simple timed "get-up-and-go test" can be done at the time of vital signs. [155] The patient is asked to get up from a chair, walk 3 meters briskly with usual ambulation aids if any, turn, walk back to the chair, and sit down. If the older person cannot complete the task in 15 seconds, a geriatric assessment and/or physical therapy referral is indicated.

RECOMMENDATIONS

1. There are unique barriers to reporting, diagnosis, and treatment in the geriatric population. (Level C)
2. Incontinence in the older person is often due to an interaction of urinary tract pathology, pelvic floor and sphincter weakness, co-morbidities, and medications in the setting of age-related changes in the lower urinary tract (Level C)
3. Treating multiple contributing factors is more likely to result in improvement in incontinence than treating a single presumed cause. (Level D)

AREAS FOR FUTURE RESEARCH

1. Numerous non-urologic contributors to urinary incontinence impact the geriatric population, therefore, research to establish the prevalence of each contributing factor, the impact on the condition of UI, and the effect of treating the contributing factor is recommended.
2. Numerous urologic, gynecologic, and conservative measures have been shown to impact therapy in the geriatric population, therefore, research to establish the impact of individual and combined therapies and their uniqe impact on this population is recommended.

V. THE PAEDIATRIC PATIENT

Urinary incontinence in children may be the result of congenital urological and or neurological abnormalities. [156] Incontinence in the post toilet training period may be related to an acquired or learned beha-

viour. Our aim in this section is to present an initial physical evaluation which should be carried out in all the children who suffer from this disorder.

1. Physical examination

a) General examination

A focused physical examination should be performed in order to demonstrate urinary incontinence, detect any urologic problem, and detect any neurological abnormalities that contribute to urinary incontinence; this must be done in a systematic fashion. [156] Abdominal examination is performed to assess obesity, surgical scars or abdominal or inguinal herniae and skin lesions that are known to be associated with neurological diseases such as neurofibromatosis. Examination should seek to palpate the kidneys, and exclude a suprapubic mass or bladder distension and the ability to provoke bladder emptying, either by gentle bladder massage, or by suprapubic compression.

Examination of the trunk should include the back and the spine, searching any skin lesion that evidence of skeletal deformities, scars from trauma, or from previous surgery, or for the presence of a subcutaneous fatty mass, cutaneous vascular malformation, tuft of hair, skin dimple, hyperpigmented area, and haemangioma or sinus tract on the lower back. Any of these may indicate an occult spinal dysraphism, warranting further neurological evaluation. A low, short gluteal cleft and flattened buttocks may indicate sacral agenesis, and are particularly important to exclude in children born to insulin-dependent diabetic mothers. Palpation of the coccyx or a lateral film of the lower spine may confirm sacral absence.

Whilst the history will provide some insight into the cause of the incontinence, the focused pelvic examination provides objective evidence that may support the working diagnosis or suggest an alternative differential diagnosis. For example, a history of continuous incontinence could be related to a bladder neck problem in a neuropathic child, it could be overflow leakage from a distended bladder, or a fistula.

b) Examination of external genetalia.

The genital examination may be performed with the patient prone, and when appropriate in the lithotomy position. The labia majora and minora, introitus and perineum are examined looking for abnormalities such as: bifid clitoris and adherence of the labia-minora; post-micturition incontinence without night-time wetting is pathognomonic of this latter condition. When the labia minora are widely separated in the inferior part or when the anus is displaced in the posterior position it may indicate a weakened and denervated perineal body. If the urethra and the vagina point to form a single channel proximally the entire mechanism may be affected, whereas a distal communication to may lead to post-void dribbling as the vagina empties after normal micturition. It is important to bear in mind that urogenital sinus abnormalities usually associated with congenital adrenal hyperplasia and evidence of masculinazation in the female child should be sought.

Another cause of incontinence is the ectopic ureter. The most common site in girls is the posterior wall of the urethra followed by vaginal vestibule, uterus and cervix. In boys careful examination of the penis must be undertaken, including retraction of the foreskin and examination of the urethral opening, to exclude meatal stenosis, hypospadias, epispadias, or duplication of the urethra.

A rectal examination is performed to evaluate faecal impaction, rectal masses, and the external anal sphincter. The latter has been seen as a surrogate for all perineal striated muscles and hence it may be used to predict urethral sphincter function (*vide infra*). The examiner may evaluate motor innervation by asking the child to voluntary contract and relax the anal sphincter against the examiner's finger. Since the abdominal straining may mimic sphincter contraction, it is useful if the observer rests the other hand on the child's abdomen during the assessment.

RECOMMENDATIONS

1. The initial assessment in children should include and consider unique congenital anatomic abnormalities, behavioural and developmental issues, and variations in conservative, pharmacological and surgical interventions. (Grade D)

FUTURE RESEARCH

1. Further research is required to evaluate the cause and effect relationship of voiding dysfunction and urinary tract infection in this patient group.

VI. THE NEUROLOGICAL PATIENT

PHYSICAL EXAMINATION

The initial assessment of the neurologic patient is reviewed in Chapter X. The basic neurological examination for the patient with urinary incontinence is presented and the reader is referred to the recommendations of the committee on the Neurogenic patient.

The neurological examination is divided into four parts: mental status, sensory function, motor function, and deep tendon reflexes.

a) Mental Status is evaluated by observing the level of consciousness, orientation, speech pattern, memory, comprehension attention deficit and activity behaviour. A bladder disorder may be associated with impairment of mental status resulting from stroke, brain tumour, degenerative neurological diseases, acute or chronic infection of central nervous system and attention- deficit hyperactivity disorder (ADHD). Toileting problems are common in the ADHDcondition, and recent studies documenting that 20% to 25 % of children with ADHD will have coexisting urinary incontinence. [157-159] The importance of orientation and cognitive function in toileting behaviour for older adults has been discussed (vide supra).

b) Sensory Function Evaluation.

This should test specific dermatomes for position, vibration, pinprick, light touch, and temperature sensation. The most important sensory dermatomes are: T4-T5 (nipples), T10 (umbilicus), L1 (base of penis, upper scrotum), L1-L2 (mid-scrotum , labia-minora), L3 (front of knee), S1 (sole and lateral area of the foot), S1- S3 (perineum and circum-anal skin), and S2-S4 (sacral nerve roots innervate both the external urethral and the anal sphincter). Furthermore, the sensory examination should include testing of the following cutaneous sacral reflexes.

The_ano-cutaneous reflex (ACR) (S2-S5) which is stimulated by light stroking of the mucocutaneous junction of the circum-anal skin can cause a visible contraction of the anal sphincter. Absence of this reflex is suggestive of sacral nerve diseases and among children with myelomeningocoele, those with a negative ACR always have some degree of sphincteric incompetence, but this is not so in the majority of those with a positive reflex. [160, 161]

Sphincter tone and voluntary contraction. The presence of voluntary contraction indicates normal pelvic floor innervation and the conus medullaris. If there is an absence or decrease of the anal sphincter tone and voluntary anal contraction there could be indication of sacral or peripheral lesion and absent canal activity. Good anal sphincter tone in the absence of voluntary anal contraction suggests a supra sacral lesion.

Bulbocavernosus reflex (BCR) - a local sacral spinal cord reflex arc reflecting activity in S2-S4. It is elicited by squeezing the glans penis or clitoris, and results in a reflex contraction of the external anal sphincter. Absence of the BCR may indicate sacral nerve damage, and is seen in children with a complete lower motor neuron lesion. [161, 162]

c) Motor Function - is assessed by examination of coordination, facial symmetry, paresis, plegias, tremor, mobility state (cane ,walker, wheelchair) muscle bulk. Important muscles to remember are the tibialis anterior (L 4-L5), and the toe extensor (L4-S1). These muscles may be tested by dorsiflexion, plantar flexion and toe extension.

4. DEEP TENDON REFLEXES reflect the integrity of upper motor neuron (UMN) and lower motor neuron (LMN) function. UMN lesions are usually associated with detrusor overactivity, whereas LMN damage may result in an acontractile bladder. Hyperactive and hypoactive deep tendon reflexes hypoactive deep tendon reflexes are suggestive of UMN and LMN function respectively. The physician usually evaluates the quadriceps (L3-L4) and Achilles' tendon (L5-S2) deep tendon reflexes. Complete spinal cord lesions above the conus medullaris (UMN/ Supra sacral/ Supra-segmental) may have hyperactive deep tendon reflexes, skeletal spasticity, a pathologic toe sign (Babinski), ankle clonus, and absent skin sensation below the level of the lesion. Complete spinal cord lesions at or below the level the conus medullaris (LMN /Sacral/ segmental) may present absent deep tendon reflexes, areflexic bladder, skeletal flaccidity, absent Babinski's sign, absent ankle clonus, and absent skin sensation below the level of the lesion. [161, 162]

Further evaluation such as vaginoscopy, cystoscopy, intravenous pyelography, retrograde pyelography, voiding urethrocystography, and urodynamic tests should be considered on the basis of the findings of the initial evaluations detailed above. [163]

VII. FAECAL INCONTINENCE ASSESSMENT

Basic assessment of faecal incontinence focuses on determining:

1. Type of incontinence

2. Functional limitations resulting from incontinence

3. Cause(s) of incontinence

1. HISTORY

In taking a history, the necessary first step is to determine the nature of the incontinence being experienced by the patient. True faecal incontinence must be differentiated from conditions that cause seepage such as external haemorrhoids, fistulas, low rectal or anal tumours, and poor perineal hygiene. Diagnostic administration of an enema may be useful in this respect; retention of the enema suggests that the patient does not have clinically significant faecal incontinence. This serves to both clarify the patient's history, but also begins to suggest the anatomical deficit causing the incontinence (see below) (**Table 2**).

Table 2. Potential data recorded on a bowel symptom questionnaire Chief complaint

Bowel pattern	Sensation of the urge to defaecate, number of movements per day, consistency: loose, soft, hard, hard pellets, faecal urgency or ability to defer defaecation , evacuation pattern: straining, anal or vaginal digitation
Continence of flatus	
Presence of passive soiling	
Pain, tenesmus, etc.	
Presence of blood or mucus	
Sensations of incomplete emptying, or prolapse	
Quantification of pad or incontinence pant use	
Fluid intake	
Toileting access	
Past medical/surgical/obstetric history, co-morbid conditions	
Medications	
Associated risk factors such as diet, smoking, and body weight	
Associated symptoms of bladder control	
Skin problems due to local irritation	
Quality of life assessment	

**Adapted from: Norton & Chelvanayagam. [182]*

a) Type of incontinence

- *Flatus incontinence* – incontinence of flatus due to inability to differentiate gas from solid or liquid
- *Passive leakage* – involuntary soiling of liquid or solid stool without patient awareness
- *Urge incontinence* – inability to defer defaecation once the urge is perceived, for long enough to find a toilet

The first two forms are primarily related to internal anal sphincter dysfunction, the latter form due to external anal sphincter dysfunction. (Grade B)[164] Soiling after defaecation is typically related to either a defect in the internal sphincter or poor "snapping shut" of the external sphincter after voiding. (Grade C) [165] It is also important to determine if the incontinence is for solid or only liquid stool; if for liquid stool, the possibility of a colonic cause of diarrhoea needs to be considered. (Grade B) [166]

b) Functional status

After confirming the nature of incontinence, assessment of the it is necessary to determine the impact of the condition on a patient's lifestyle and quality of life. This assessment offers the opportunity to both empathise with the patient and to understand the pertinent emotional and social factors in the manifestation of symptoms. The history should include:

- Need to wear tissues or pads in underwear – indication of severity. (Grade B) [167-169]
- Degree of soiling of tissues, pads or underwear. (Grade C) [167-169]
- Duration, frequency and timing of incontinence episodes – indication of severity. (Grade C) [Soffer, 2000 #214;Cooper, 2000 #213

Ability to wear clothing of choice, eat food of choice, participate in work and social activity. (Grade C) [167-140]

Severity of faecal incontinence can be classified as:

- minor - if faecal seepage occurs less than once a month,
- moderate - if there is incontinence to solids more than once a month or liquids more than once a week, and
- severe - if there is loss of control of solids several times a week or liquids on a daily basis.

An alternative classification grades continence as follows:

Grade 1: Complete

Grade 2: Incontinence of flatus

Grade 3: Incontinence of flatus and liquid stools

Grade4: Incontinence of flatus, liquid stools, and solid stools.

c) Aetiology

A careful, thorough history and full physical examination are essential and will identify the majority of causes of faecal incontinence. The history should include:

- Dietary history – in particular excess ingestion of sorbitol and caffeine. (Grade C) [171]
- Medical history – particularly anti-anginals, antihypertensives which may reduce sphincter tone, and ferrous sulphate or antacids which may provoke diarrhoea. (Grade C) [168]
- Presence of benign anal disease – haemorrhoids, fistula, anal warts. (Grade B) [172]
- History of chronic straining – suggestive of rectal mucosal prolapse, an important cause of internal anal sphincter and dysfunction. (Grade B) [173]
- Obstetric history – particularly with regard to: (Grade B) [174, 175]
  - number of vaginal deliveries
  - need for forceps or Ventouse
  - birth weights
  - duration of second stage(s)
  - episiotomy
- Perianal surgery history – particularly: (Grade B) [176]
- Anal fissure surgery (sphincterotomy or anal stretch)
- Fistula surgery
- Low colonic resection surgery
- History of pelvic radiation – risk of radiation proctitis (causing heightened rectal contractions) and internal anal sphincter radiation damage (Grade B) [177]

2. EXAMINATION

Examination is focussed towards the detection of evidence of incontinence and identifying the cause of incontinence.

a) Evidence of incontinence

Physical examination should include inspection of underclothing for soiling and staining by stool, pus, or mucus. Perianal skin should be examined for irritation and excoriation due to over-zealous hygiene. Perianal inspection should include attempts to identify: (Grade B) [169, 178, 179]

- Perianal excoriation or erythema – suggestive of chronic passive soiling
- A patulous anus or one which gapes on gentle traction of the anal verge
- A "keyhole" deformity of the anal canal – suggesting a persisting sphincter defect

b) Cause of incontinence

Inspection may reveal scars from previous episiotomies or obstetric tears. Abnormalities at the anal verge from previous surgery or a gaping anus suggestive of marked loss of function may be present. Perianal inspection should identify: (Grade C) [169, 178, 179]

- Scars from previous surgery
- Perianal disease – prolapsing haemorrhoids, fistula, anal warts
- Absence of perineal body – suggestive of obstetric trauma; at its worst this may manifest as a cloacal deformity
- Inspection for sphincter asymmetry whilst patient contracts sphincter – suggestive of regional sphincter defect
- Function of the puborectalis muscle (palpable at the anorectal junction) is assessed by asking the patient to squeeze the sphincter at which time the puborectalis should push the examiner's finger anteriorly.

Digital examination should identify: (Grade C) [164, 178, 179]

- Rectal content – if faecal impaction is present this could explain incontinence
- Resting tone – indicative of internal anal sphincter function
- Voluntary and involuntary squeeze pressure – indicative of external anal sphincter function and potential function, respectively. The latter is elicited most commonly by asking the patient to cough while assessing sphincter tone – a cough causes a near-maximal eternal sphincter contraction (ana-

logous to the guarding reflex in the bladder)

- Regional sphincter defects – detected as asymmetry
- A thickened sphincter – suggestive of chronic straining and occult rectal mucosal prolapse)

If suggested by earlier findings (history of straining, thickened sphincter), the patient should be asked to sit on a commode and attempt voiding – the perineum should then be inspected for evidence of a rectal mucosal or full thickness prolapse (Grade C) [173]

Proctoscopy or rectosigmoidoscopy with a rigid instrument is a bedside test of value in excluding potentially treatable causes of faecal incontinence:

- Anal tumours or polyps
- Low rectal cancers or adenoma (Grade B) [180]

Solitary rectal ulcer syndrome – a functional disorder of evacuation, in which repeated straining at stool and rectal self-digitation results in an ulcerated area of the anterior rectal wall (Grade C) [181]

Physiological and complimentary radiological tests are used to confirm clinical suspicions and provide objective data on the function of the anorectum. Pelvic floor dysfunction is a complex problem and multiple tests may be needed (**Table 3**).

3. Future research

- Development and validation of a digital (finger) instrument to assess anal sphincter function (analogous to the instrument in existence for urological assessment of pelvic floor musculature).
- Understanding the psychological and social factors around the time of presentation to specialist / GP with faecal incontinence; there is often a long delay between symptom onset and presentation, which is likely to reflect environmental rather than physical factors.
- Combined urinary and faecal incontinence – physical and environmental differences with those patients presenting with isolated urinary or faecal incontinence.

Table 3. Tests of anorectal function for the patient with faecal incontinence

A. Initial Evaluation		
1. History of symptoms to include psychosocial history		
2. Examination to include visual and digital exam (including while straining on the toilet)		
B. Prior to Surgical Intervention	**1. Anorectal manometry to include compliance (P/V relationship)**	
2. Ultrasound of the anal canal		
3. Visualise the colon (proctosigmoidoscopy, colonoscopy)		
4. Abdominal X-ray		
C. Optional		
1. Pudendal nerve terminal motor latency		
2. Electromyography		
D. Research		
1. Barostat		
2. MRI		
3. Vector manometry		
E. Levels of Evidence for:		
Anorectal Manometry	2 - for accuracy;	3 - for outcomes
Ultrasound	2 - for accuracy;	3 - for outcomes
	PNTML	3

VIII. OVERALL RECOMMENDATIONS

• Urinary Incontinence

1. Whilst suggestive of LUTD, LUTS cannot be used to make a definitive diagnosis; they may also indicate pathologies other than LUTD. Grade D
2. Signs suggestive of LUTD are observed by the physician including simple means to verify symptoms and quantify them. Grade D
3. Urinary or faecal incontinence should be further described by specifying relevant factors such as type, frequency, severity, precipitating factors, social impact, effect on hygiene and quality of life, the measures used to contain the leakage and whether or not the individual seeks or desires help. Grade D

4. Urinary retention may be a cause of LUTS associated with decreased urinary storage, and the decision to perform a PVR in sub-groups of patients should be based on pathophysiology and in individuals is based on symptoms. Grade D

5. A PVR should be performed in patients where decreased bladder emptying is suspected, especially if treatments that decrease bladder contractility or increase outlet resistance are being considered. Grade D

6. It is considered standard to perform a urinalysis either by using a dipstick test or examining the spun sediment. Grade D

7. If a dipstick test is used, it is recommended that a "multiproperty" strip that includes fields for haematuria, glucose, leukocyte esterase and nitrite tests be chosen. Grade D

8. Additional tests available on urine dipstick strips, such a protein, bilirubin, ketones and pH, may be helpful in the broader medical management of patients. However, they are not essential in the context of evaluation of the patient with urinary incontinence or lower urinary tract symptoms. Grade D

9. Although the value of individual urinary symptoms and symptom complexes in predicting the underlying abnormality of lower urinary tract function is not high, a significant proportion of women with stress incontinence can be correctly diagnosed from basic evaluation only. Grade C

10. The frequency/volume chart or urinary diary is the most effective additional test for use alongside basic evaluation in primary or secondary care. Grade C

11. In assessing patients with urinary or faecal incontinence, cognisance should be taken of all aspects of pelvic floor dysfunction, i.e. urinary, bowel, prolapse, and sexual function. Grade D

12. In describing patients with pelvic organ prolapse, one of the several systems available for classification and quantification of prolapse should be employed. Grade D

13. Male patients differ from female patients in the presentation of LUTS. The incidence of OAB wet is lower until the 7th decade. Grade C

14. Stress urinary incontinence is primarily associated with surgery of the prostate in male patients. Grade B

15. Disorders of bladder emptying from benign prostatic enlargement should be considered before treating male patients for OAB symptoms. Grade C

• Fecal Incontinence

16. Basic assessment of fecal incontinence focuses on determining the type, the functional limitations and the causes. Grade C.

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