Guidelines for Diagnostic Assessment and Advanced Study of Lower Urinary Tract Symptoms Suggestive of Benign Prostatic Hyperplasia

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Lower urinary tract symptoms (LUTS) include storage symptoms (increased bladder sensation, frequency, urgency, urge incontinence and nocturia), voiding symptoms (hesitancy, dysuria, intermittency, small caliber of urine, terminal dribble and residual urine sensation) and pain (pelvic, perineal and urethral pain). LUTS are highly prevalent in men and women and increase with age [1]. Because LUTS are common among elderly men, they are usually considered synonymous with benign prostatic hyperplasia (BPH). However, it as been estimated that only 25 to 50% of men with BPH have LUTS, and only 50% of men with LUTS have urodynamically proven bladder outlet obstruction (BOO) due to BPH or other urethral conditions [2]. Although BPH is one of the most common diseases in the elderly, not all LUTS in patients are caused by BPH. In fact, LUTS can be the clinical presentation of overactive bladder (OAB) or BOO in both men and women, and in the elderly and children. Using LUTS as a diagnosis for BOO or BPH could be inappropriate and lead to an incorrect therapeutic strategy.

BOO in men can be a result of prostatic enlargement (BPH or prostatic cancer), bladder neck dysfunction, spastic urethral sphincter, poor relaxation of the urethral sphincter, urethral stricture or pseudodyssynergia due to underlying neuropathy such as stroke or Parkinson's disease. In addition, OAB and impaired detrusor contractility are frequently noted in association with BOO.

In the diagnosis of LUTS suggestive of BPH (LUTS/BPH), the following questions should be considered: (1) Is there an obstruction? (2) Are the LUTS caused by an enlarged prostate? (3) Are we treating BPH or LUTS? (4) Can management targeting BPH reduce LUTS? (5) What are the appropriate tools to diagnose an obstructed BPH? (6) Should patients with LUTS be treated before BOO is confirmed?

INITIAL ASSESSMENT OF LUTS/BPH

The initial assessments of LUTS/BPH should include the following four domains:

Patient history

A family history of prostatic disease and prostatic cancer, a history of lower urinary tract disease such as bladder stones, cystoscopic examination, transurethral surgery, any systemic disease (such as diabetes, hypertension, cerebral vascular accident, Parkinson's disease, chronic obstructive pulmonary disease, asthma) and a history of administration of alpha-blockers, 5-alpha-reductase inhibitors, antimuscarinics, or neurological medications should be recorded.

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Present illness

The duration of LUTS (acute or chronic onset) and associated symptoms (colic pain, tenesmus, constipation, abdominal discomfort) should be recorded. LUTS can be assessed with the International Prostate Symptom Score (IPSS) or the American Urological Association Symptom Index (AUA-SI) [3]. The dominant symptoms should be assessed separately as storage and voiding symptoms. The IPSS total symptom score can be classified as mild (<8), moderate (8-19) or severe (>20) [4]. The quality of life index (QoL-I) of IPSS should also be recorded.

Previous studies have shown weak correlations of LUTS with prostate size, uroflow measures and pressure flow study data [5-8]. Nevertheless, the AUA-SI was found effective in predicting BPH progression to surgery [9]. The symptom score can quantify symptoms for the evaluation of treatment for BPH rather than diagnosis of BPH [10].

Physical examination

Patients should be examined systemically and locally. The presence of an abdominal scar, a palpable, distended bladder and genital lesions should be carefully examined. A digital rectal examination (DRE) of prostatic consistency, prostatic size, surface and any abnormal nodularity should be carefully done. In addition, a focal neurological examination including evaluations of the bulbocavernous reflex, anal sphincter contraction, and saddle sensation should be done when performing a DRE.

Laboratory tests

When a patient complains of urethral symptoms (micturition pain, burning sensation), a urinalysis should be performed. When the urinalysis shows miscroscopic hematuria or pyuria, a KUB radiograph should be done to investigate whether there are bladder or lower ureteral stones. Blood urea nitrogen and creatinine levels should be investigated when chronic urinary retention is noted. The prostatic specific antigen (PSA) level is indicated in all patients with an enlarged prostate or abnormal DRE findings. Men with high PSA levels have a higher risk of future growth of the prostate, symptom and flow rate deterioration, acute urinary retention and BPH-related surgery [11-13]. BPH levels increase with age [14] and approximately 25% of men with BPH have a PSA of>4 ng/mL [15]. PSA testing is more appropriate for patients whose future natural life span is likely to be more than 10 years. Uroflowmetry and subsequent postvoid residual (PVR) should be measured concomitantly. Bladder sonography is indicated to measure the PVR and to investigate bladder stones, bladder wall thickness and intravesical prostate growth. However, uroflow study has poor diagnostic specificity for BOO [16].

SPECIFIC UROLOGICAL ASSESSMENTS

Maximum flow rate (Qmax) and PVR

Qmax is valuable in the diagnosis of urodynamic BOO. A Qmax of less than 10 mL/s has a high predictive value for BOO, however, a Qmax of>10 mL/s cannot exclude the possibility of a high pressure and high flow BOO [17]. PVR measurement is important in the interpretation of the Qmax. In addition, the flow pattern should be used for diagnosis of BOO, impaired detrusor contractility, and poor urethral sphincter relaxation. The flow pattern can be classified as normal, compressive obstructive, constrictive obstructive, intermittent and terminal dribble flow patterns. The voiding efficiency can be calculated from the voided volume divided by the total bladder capacity.

Prostatic volume

The prostatic volume measurement can be obtained by DRE, transrectal sonography, or transabdominal sonography. DRE has been found reliable in estimating the total prostatic volume (TPV) [18] but transrectal sonography is far more accurate in estimation of the TPV and the transition zone volume (TZ) as well as calculation of the transition zone index (TZI). A prostatic volume of more than 30 mL and endoscopically kissing lobes were associated with BOO in 95% of Japanese BPH patients [19]. However, in a Taiwanese study, a TPV of 30-40 mL had a sensitivity of 71.4% whereas a TPV of >40 mL had a 92% sensitivity in diagnosing BOO [20]. Patients with an estimated bladder weight greater than 35 gm on ultrasonography were 13.4% times more likely to develop acute urinary retention than patients with a lower bladder weight [21]. A good correlation was noted between a TZI>0.5, the AUA-SI, Qmax and detrusor pressure at Qmax (Pdet.Qmax) [22,23]. A TZI of>0.5 was found to have a 90% sensitivity in diagnosing BOO [20]. Using ultrasound, intravesical prostatic enlargement or median lobe enlargement, as well as bladder wall trabeculation, can be detected. A significant correlation between bladder wall trabeculation and the grade of BOO has been reported [24,25].

Image studies

Excretion urography is necessary to investigate upper urinary tract conditions especially when a urinalysis shows hematuria or pyuria. Bladder base elevation on a cystogram does not correlate with the grade of BOO [26]. Renal sonography can be a tool to examine the renal condition in patients with azotemia or hematuria. Cystoscopy should be performed to investigate hematuria or suspicious bladder stones. Cystoscopy should not be used to diagnose BOO or to determine the grade of BOO [27]. There is no role for CT and MRI in the diagnosis of LUTS/BPH.

CLINICAL PROSTATIC SCORE FOR DIAGNOSIS OF BENIGN PROSTATE OBSTRUCTION (BPO)

Patients with LUTS/BPH might have several possible diagnoses other than benign prostatic obstruction. In order to make a diagnosis of clinical BPH, at least two of the following three criteria should be present: moderate to severe LUTS (IPSS≥8), an enlarged prostate (TPV ≥30 mL) and a decreased Qmax (≤5 mL/s) [28]. There are two scoring systems used in the diagnosis of clinical BPH. Rosier used non-invasive parameters to estimate the probability of BPO. He scored the TPV, Qmax, PVR and voided volume and measured the sum of each item. A total score of>11 indicated a 80% probability of BPO whereas a score of <8 had a 64% probability of BPO [29]. Kuo used a total score consisting of scores for the Qmax, flow pattern, TPV, TZI, PVR, voided volume and median lobe enlargement. A higher total score resulted in a higher sensitivity but a lower specificity. When a patient had one favorable predictive factor such as a constrictive obstructive flow pattern, a TPV>40 mL, PVR of>100 mL, TZI>0.5 and presence of a median lobe, the sensitivity for BPO was 91.6% and the specificity was 87.3% [30]. When patients plan to undergo invasive therapy, more predictive factors provide a higher sensitivity for BPO and, therefore, result in a higher success rate.

URODYNAMIC STUDY IN DIAGNOSIS OF BPO

Because the correlation between LUTS, DRE, and cystoscopy, and BOO is poor [31], urodynamic study has been regarded as the only way of establishing the diagnosis of BOO [32]. Although a urodynamic study is not necessary in short term treatment of LUTS/BPH, most urologists believe that pressure flow study should be undertaken prior to surgery in neurologically normal men with LUTS and a low Qmax [17], and in men with LUTS and voiding dysfunction of uncertain etiology [33].

Pressure flow study provides valuable information on detrusor function, such as detrusor overactivity, in 60% of patients with BOO, impaired contractility and non-BOO. However, urodynamic study also can result in morbidity, such as urinary tract infection in 4%-6% of patients, and dysuria in 75% of men with and 55% of men without BOO [33]. Although pressure flow study can establish the diagnosis of BOO, in one study, the symptomatic outcome of treatment modalities for BPH did not differ among different degrees of BOO [23].

In performing pressure flow study, the standardization of procedure and interpretation should be carefully made [34]. The catheter size should be no larger than 8 Fr [35], the intravesical and intra-abdominal pressure should be measured concomitantly and the pressure flow result should be reproducible [32]. The least obstructed of the two studies should be used for interpretation. However, repeat investigation is unnecessary if the results of the first study are plausible and clearly show non-obstruction or obstruction.

The Abrams-Griffiths number [36] and Schafer nomogram [37] have been recommended to diagnose BOO in pressure flow study. In patients with an equivocal A-G number, less invasive treatment for BPO should be given [38].

Videourodynamic study provides a more accurate diagnosis of BPO and other bladder and urethral conditions responsible for LUTS, such as detrusor overactivity, impaired detrusor contractility, hypersensitive bladder, poor relaxation of the urethral sphincter, bladder neck dysfunction, pseudodyssynergia, detrusor underactivity and normal bladder and urethra [39]. In the patients with both storage and voiding LUTS, the incidence of detrusor overactivity increases with age, while the incidence of poor relaxation of the urethral sphincter increases as age decreases [40].

DIAGNOSIS SEQUENCE AND TREATMENT ALGORITHM FOR LUTS/BPH

A diagnostic sequence for LUTS/BPH may aid in determining the therapeutic strategy for LUTS/BPH [41]. In the initial assessment, the

history, IPSS, DRE, laboratory test, uroflowmetry and PVR provide information for diagnosis of BPO and non-BPO. Short term alpha-blockers, such as tamsulosin, doxazosin, terazosin or alfulzosin, can be used for about 2 weeks. If patients do not respond to initial medication, measurement of the prostatic volume and PSA should be done and 5-alpha-reductase inhibitors such as dutasteride or finasteride can be added in the presence of a large TPV (≥30 mL), Qmax≤15 mL/s and moderate IPSS (≥8). If patient does not respond to combination therapy well, a voiding diary (for nocturnal polyuria), pressure flow study (for detrusor overactivity) or videourodynamic study (for poor relaxation of the urethral sphincter) should be carried out to investigate a diagnosis other than BPO, and other medications such as antimuscarinics, desmopressin, or skeletal muscle relaxants can be added to the therapeutic regimens. Cystoscopy may be an additional procedure to diagnose urethral strictures, bladder stones, or other urethral lesions. Surgical intervention for BPH should be performed only when a diagnosis of BPO has been clearly established.

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TCS 尿路動力學技術員訓練課程
Training Program for Urodynamic Technician

日期：2008 年 8 月 9 、10 日（週六、日）
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Day 1 (8/9)	**Topics**	**Speakers**
09:00~09:30	Anatomy of Lower Urinary Tract / 下泌尿道解剖學	陳欣宏
09:30~10:00	Physiology of Micturtion / 排尿生理學	余宏政
10:00~10:30	Voiding Diary and Interpretation / 排尿日記判讀	郭漢崇
10:30~10:45	Break	
10:45~11:15	Uroflowmetry / 尿流速檢查	葉忠信
11:15~11:45	Cystometrography / 膀胱壓力檢查	陳志碩
11:45~12:15	Urethral Sphincter EMG Study / 尿道括約肌肌電圖檢查	陳景亮
12:15~14:00	Lunch	
14:00~14:30	Urethral Pressure Profilometry / 尿道壓力檢查	龍震宇
14:30~15:00	Pressure Flow Study / 壓力流速檢查	盧星華
15:00~15:30	Videourodynamic Study / 錄影尿路動態學檢查	林登龍
15:30~15:45	Break	
15:45~16:15	Voiding Training and Clean Intermittent Catheterization / 排尿訓練及清潔間歇性導尿	陳淑月
16:15~16:45	Change and Long Term Care of Cystostomy / 膀胱造瘻更換和長期照護	江明珠
Day 2 (8/10)	**Topics**	**Speakers**
09:00~09:30	Biofeedback Pelvic Floor Muscle Training / 生理回饋骨盆底肌肉訓練	蔡娟秀
09:30~10:00	Electrical Stimulation for Lower Urinary Tract Dysfunction / 電刺激治療下泌尿道功能失調	陳怡靜
10:00~10:30	Medication for Lower Urinary Tract Dysfunction / 下泌尿道功能失調藥物治療	唐一清
10:30~10:45	Break	
10:45~11:15	Urinary Tract Infection in Chronic Catheterized Patients / 泌尿道感染於慢性放置尿管病患	楊緒棣
11:15~11:45	Intravesical Treatment for Lower Urdoary Tract Dysfunction / 下泌尿道功能失調的灌注治療	莊耀吉
11:45~12:15	Surgical Intervention for Lower Urinary Tract Dysfunction / 下泌尿道功能失調的手術治療	郭漢崇
12:15~14:00	Lunch	
14:00~15:10	筆試	王炯瑾

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