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Review Article

Use of the International Prostate Symptom Score voiding-to-storage subscore ratio in assessing lower urinary tract symptoms

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ABSTRACT

The International Prostate Symptoms Score (IPSS) questionnaire has been used for decades to evaluate the severity of lower urinary tract symptoms (LUTS)/benign prostatic obstruction, and has also been applied to other conditions causing LUTS. However, the total IPSS correlates poorly with benign prostatic obstruction and overactive bladder, and is unreliable for establishing a definitive diagnosis. Although the clinical symptoms are not reliable in establishing the diagnosis, patients with bladder outlet-related lower urinary tract disease (LUTD) tend to have more prominent voiding symptoms and those with bladder-related LUTD tend to have more prominent storage symptoms. Measuring IPSS subscores and calculating the IPSS voiding-to-storage subscore ratio (IPSS-V/S) constitute a simple and reliable method to differentiate failure-to-void (bladder outlet-related) LUTD from failure-to-storage (bladder-related) LUTD. The IPSS-V/S is a better predictor of bladder outlet-related LUTD than the total IPSS, whether used alone or in combination with the total prostate volume and maximal flow rate. The IPSS-V/S can also be used as a guide for the initial treatment of male LUTS, especially by nonurologists. First-line antimuscarinic monotherapy for males with an IPSS-V/S of ≤ 1 is safe and effective. The IPSS may be used to evaluate female LUTD. The IPSS-V/S was found to have the highest area under the receiver-operating characteristic curve for predicting voiding LUTD when compared with other noninvasive methods. This ratio is also a useful indicator to initiate treatment of voiding dysfunction in women.

1. Introduction

Lower urinary tract symptoms (LUTS) include voiding, storage, and postmicturition symptoms [1]. LUTS may result from a complex interplay of the pathophysiological features of bladder dysfunction and bladder outlet dysfunction, e.g., benign prostatic obstruction (BPO), bladder neck dysfunction, and poor relaxation of the urethral sphincter [2]. Treatment of LUTS in men depends on the etiology of symptoms. Traditionally, LUTS in men has been attributed to BPO and is treated with α-blockers [3]. However, men who receive treatment for prostate conditions may have persistent storage symptoms [4,5]; recent studies have indicated a shift from the prostate to the bladder as a potential source of LUTS [3].

Current guidelines suggest that antimuscarinic monotherapy can be used for men with storage LUTS who do not have voiding LUTS or bladder outlet obstruction (BOO). Combination therapy is recommended for men with concomitant BOO and an overactive bladder, if symptom relief has been insufficient after monotherapy for either disorder [6–9]. However, the presence and degree of BOO may be difficult to determine without a pressure flow study. The symptom score, urine flow rate, and total prostate volume (TPV) are commonly used, but these parameters are poor predictors of BOO when used alone [3,10]. In addition, there are still no definitive criteria to determine whether a patient should receive antimuscarinic monotherapy or combination therapy.

2. International Prostate Symptom Score voiding-to-storage subscore ratio

The International Prostate Symptom Score (IPSS) consists of seven questions that are used to assess voiding symptoms (incomplete emptying, intermittency, weak stream, and straining to void) and storage symptoms (frequency, urgency, and nocturia)

Conflicts of interest: none.

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[11]. The IPSS questionnaire has been used for decades to evaluate the severity of LUTS/BPO and other conditions that cause LUTS. However, the total IPSS (IPSS-T) correlates poorly with BOO and overactive bladder, and is unreliable for establishing a definitive diagnosis [10]. Although the clinical symptoms are not always reliable for establishing a diagnosis, patients with bladder outlet-related lower urinary tract disease (LUTD) tend to have more prominent voiding symptoms, whereas those with bladder-related LUTD tend to have more prominent storage symptoms.

The IPSS can be subdivided into the IPSS voiding subscore (IPSS-V) and the IPSS storage subscore (IPSS-S). The IPSS-V is the sum of the answers to question 1 (incomplete emptying), question 3 (intermittency), question 5 (weak stream), and question 6 (straining to void). By contrast, the IPSS-S is the sum of the answers to question 2 (frequency), question 4 (urgency), and question 7 (nocturia). The IPSS subscore can be used to evaluate symptom severity or the results of treatment. However, it is difficult to use the IPSS subscore as a diagnostic tool because of the overlap between bladder-related and bladder outlet-related LUTD.

3. Using the IPSS-V to IPSS-S ratio to evaluate male LUTS prior to initiating drug therapy

Liao et al [12] reported a retrospective study of 253 men with LUTS. Each patient was investigated with video urodynamics to make a definitive diagnosis. The various diagnoses included idiopathic detrusor overactivity (DO), increased bladder sensitivity, detrusor hyper-reflexia and impaired contractility, urethral stricture, BPO, bladder neck dysfunction, and poor relaxation of the urethral sphincter. Patients with bladder outlet-related LUTD had a significantly higher IPSS-V–IPSS-S ratio (IPSS-V/S) than those with bladder-related LUTD. Although patients with combined BPO and DO had a significantly lower IPSS-V/S than those with BPO and no DO, their average IPSS-V/S was still higher than those with DO alone.

The IPSS-V and IPSS-S of each patient, obtained from the study of Liao et al [12], were plotted, with the IPSS-V on the vertical axis and the IPSS-S on the horizontal axis (Fig. 1). A line (IPSS-V/S = 1) was drawn to differentiate patients with bladder-related LUTD from those with bladder outlet-related LUTD. The IPSS-V/S of each patient was calculated and used as a potential diagnostic indicator.

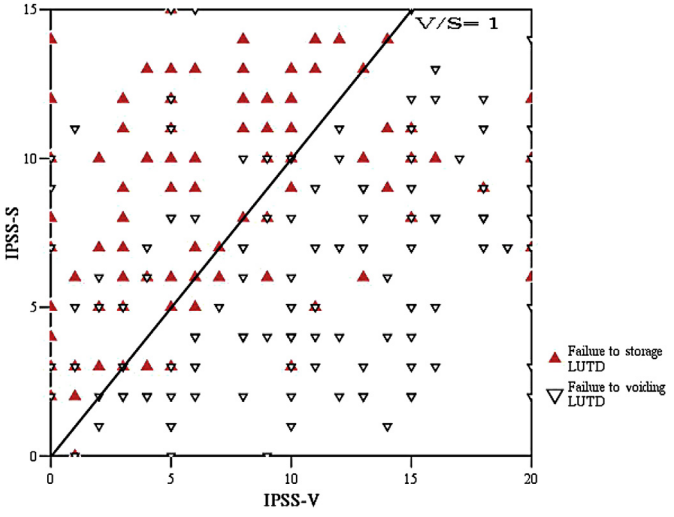

Fig. 1. IPSS-V (vertical axis) and IPSS-S (horizontal axis) of each patient, as obtained from the study of Liao et al [12], are plotted. A line (IPSS V/S = 1) has been drawn to differentiate patients with bladder-related LUTD from those with bladder outlet-related LUTD. The IPSS-V to IPSS-S ratio (IPSS-V/S) of each patient was calculated and used as a potential diagnostic indicator. BPH = benign prostatic hyperplasia; IPSS = International Prostate Symptom Score; IPSS-S = IPSS storage subscore; IPSS-V = IPSS voiding subscore; LUTD = lower urinary tract disease; OAB = overactive bladder.

The area under the receiver-operating characteristic curve was used to evaluate the diagnostic value of various noninvasive methods for predicting failure to void (bladder outlet-related) and failure to store (bladder-related) LUTD. The IPSS-V/S was a better predictor than the IPSS-T, IPSS-V, IPSS-S, maximal flow rate (Q_{max}), postvoid residual (PVR), and TPV. An IPSS-V/S with a cutoff value of 1 had a high sensitivity and acceptable specificity. Bladder-related LUTD was found in 75.7% of patients with an IPSS-V/S of $\leq$1, whereas bladder outlet-related LUTD was found in 81.2% of patients with an IPSS-V/S of >1 [12].

4. Diagnosis using the IPSS-V/S combined with TPV and Q_{max}

In one study, the combination of a TPV of $\geq$30 mL and a Q_{max} of $\leq$10 mL/second had a positive predictive value (PPV) of 68.8% and a negative predictive value (NPV) of 53.5% for bladder outlet-related LUTD. When an IPSS-T of $\geq$12 or an IPSS-T of $\geq$15 was considered as an additional criterion, the PPV increased to 75.0% and 78.5%, respectively, and the NPV decreased to 50.9% and 50.2%, respectively. When an IPSS-V/S of >1 or >2 was factored into the equation instead of the IPSS-T, the PPV was 91.4% and 97.3%, respectively, and the NPV was 54.8% and 49.8%, respectively [13]. We suggest that the IPSS-V/S combined with the TPV and Q_{max} results in a higher PPV than the IPSS-T.

5. Treatment based on the IPSS-V/S

The IPSS-V/S may serve as an indicator to initiate treatment for male patients with LUTS. A prospective study was conducted to investigate treatment results based on the IPSS-V/S [14]. First-line doxazosin and tolterodine monotherapy were given to patients with an IPSS-V/S of >1 and IPSS-V/S of $\leq$1, respectively. After medical treatment for 1 month, 76.7% of patients administered tolterodine and 78.1% administered doxazosin reported an improved outcome (global response assessment $\geq$1 point). No patient developed urinary retention after tolterodine monotherapy for 1 month. However, patients older than 70 years were more likely to have an increased PVR ($\geq$50 mL). Combination therapy or change to another medication may be considered if first-line treatment fails.

6. Safety of first-line treatment with antimuscarinics in patients with an enlarged prostate

Traditionally, antimuscarinics have been contraindicated in patients with an enlarged prostate. Although several studies have reported the safety of antimuscarinics in males with no elevated PVR (200–250 mL), there is often a concern that the inhibitory effect of antimuscarinics may aggravate voiding difficulties or cause urinary retention [15,16]. To examine the safety of first-line antimuscarinics in patients with an enlarged prostate, another prospective open-label study, enrolling men with an IPSS-T of $\geq$8, a TPV of $\geq$20 mL, an IPSS quality-of-life index of $\geq$2, an IPSS-V/S of $\leq$1, and a PVR of $\leq$250 mL, was conducted [17]. First-line antimuscarinics improved symptoms and quality of life for 12 weeks. Around 10% of patients complained of dysuria, and the average PVR increased significantly, to around 20 mL. However, no urinary retention developed. Regression analyses showed that the baseline Q_{max}, baseline IPSS-S, and TPV were predictors of successful antimuscarinic monotherapy.

7. Use of IPSS and IPSS-V/S in women

The IPSS can also be used to evaluate female LUTD. Okamura et al [18] performed psychometric analysis of the IPSS for female LUTS. The reliability and validity of the IPSS for female LUTS was tested. They concluded that the IPSS can be relevant when used to examine women, as it is in men. The IPSS has also been used in several epidemiological studies to evaluate the prevalence of female LUTS and voiding dysfunction [19,20]. On and Ku [21] reported a comparative study of IPSS and urodynamic parameters in men and women with LUTS. The IPSS-V was higher in men, whereas the Q_{max} was higher in women. Multiple linear regression analysis identified that frequency possibly explained a reduction in the quality of life in elderly women.

Hsiao et al [22] investigated the feasibility of using the IPSS and IPSS-V/S to evaluate female LUTS. They reported that significantly higher IPSS-V/S and IPSS-V were found in those with voiding dysfunction. The IPSS-V/S was found to have the highest area under the receiver-operating characteristic curve for predicting voiding LUTD, when compared with other noninvasive methods. An IPSS-V/S of $\geq$1.33 had the best predictive value for female voiding LUTD with a high NPV (97.4%). The IPSS-V/S may provide an initial guide for the treatment of voiding dysfunction in women. In addition, the IPSS-S may be used for evaluating storage LUTD in women.

One problem, reported by Coyne et al [23], is that the LUTS that are excluded from the IPSS, most notably incontinence, are prevalent even among mildly symptomatic participants. They suggested that because storage symptoms appear to drive treatment seeking, identifying, and treating these symptoms are essential when caring for patients with LUTS.

8. Conclusion

LUTS may involve bladder dysfunction and bladder outlet disorders. Treatment should be based on the most likely etiology. Medication may be given to relieve outlet resistance and decrease bladder sensation or DO. The use of IPSS subscores and calculation of the IPSS-V/S can help differentiate between bladder- and bladder outlet-related LUTD. The IPSS-V/S is a better predictor of bladder outlet-related LUTD than the IPSS-T, whether used alone or in combination with the TPV and Q_{max}. The IPSS-V/S can also be used as a guide for the initial treatment of male LUTS, especially by nonurologists. First-line antimuscarinic monotherapy for males with an IPSS-V/S of $\leq$1 is safe and effective. The IPSS can also be used to evaluate female LUTD. The IPSS-V/S was found to have the highest area under the receiver-operating characteristic curve for predicting voiding LUTD, when compared with other noninvasive methods. This ratio may also provide an initial guide for the treatment of voiding dysfunction in women.

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