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Twenty-minute pad test: Comparison of infusion of 250 ml of water with strong-desire amount in the bladder in women with stress urinary incontinence

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Abstract

Objective: The objective was to compare the sensitivity of the 20-min pad test by infusion of 250 ml of water with the strong-desire amount in the bladder in women with stress urinary incontinence (SUI).
Study design: Eighty-three women with SUI were enrolled between November 2005 and January 2006. The 20-min pad test by infusion of 250 ml of water was performed before urodynamic study (UDS). The strong-desire amount pad test was done after UDS. The results were analyzed by Pearson's χ^2 and Wilcoxon's signed-rank tests.
Results: The sensitivity by infusion of the strong-desire amount was better than infusion of 250 ml of water in the 20-min pad test ($P < 0.001$). In the quantitative study, the two pad tests had fair agreement and the pad weight results of the infusion of the strong-desire amount were statistically higher than the infusion of 250 ml of water ($P = 0.0004$).
Conclusions: The infusion of the strong-desire amount had better sensitivity measured by the 20-min pad test in women with SUI compared with infusion of 250 ml of water in the bladder.

Keywords: Twenty-minute pad test; Strong-desire amount; Stress urinary incontinence; Urodynamic study

1. Introduction

Pad testing is a simple, noninvasive, and effective method of quantifying the amount of urine loss in patients with urinary incontinence. This test was initially proposed by Sutherst et al. in 1981 and modified by the Standardization Committee of the International Continence Society (ICS) in 1988 [1,2]. Pad testing may also be useful to document urinary incontinence that is not discovered on clinical or urodynamic evaluation. In general, up to 10% of all patients undergoing urodynamic evaluation may fail to leak urine during office testing, despite complaints of urinary incontinence in their normal environment [3,4]. Several pad tests have been described in the literature [5]. Short-term pad tests that last 15 min–2 h can be performed in the office. Long-term pad tests that last 24–48 h can be performed while patients go about their everyday life in their usual surroundings [5]. The short-term office tests have shown some advantages. They are easy, quick, and provide immediate information. Patient compliance can be monitored directly. The weighing of the pad is also done under standard conditions. The major disadvantage is the lack of validity. The short-term office test gives no impression of the condition of leakage in the patient's everyday life, but simply quantifies the insufficiency of the urethral sphincter under experimental conditions [5].

The ICS 1-h pad test is started without the patient voiding and the patient drinks 500 ml of sodium-free liquid [2]. After

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the patient sits or rests for 30 min, the patient performs the recommended activities. Therefore, we cannot know the exact bladder volume when the ICS 1-h pad test begins. In our department, we use a 20-min modified pad test proposed by Hahn and Fall [6] and modified by Sand and Ostergard [3]. The 20-min pad test uses 250 ml of sterile water instilled directly into an empty bladder with a catheter rather than relying on variable diuresis for a 0.5 h at the beginning of a 1-h pad test by ICS.

The pad weight result can serve as an objective outcome procedure in pre- and post-treatment in patients with urinary incontinence. In our previous study, we found that the 20-min pad test had better sensitivity than the 1-h pad test in patients with stress urinary incontinence [7]. However, in our experience the fixed volume of infused water in the bladder could not always provoke urine leakage in each woman with stress urinary incontinence (SUI). Due to the different bladder volumes of each patient, we tried to infuse strong-desire amounts that could more precisely reflect the full bladder capacity in each patient. Therefore, we aimed to compare the difference in sensitivity of a 20-min pad test by infusion of 250 ml of water versus the strong-desire amount in the bladder for women with SUI.

2. Patients and methods

Eighty-three women with symptoms of SUI who underwent urodynamic study (UDS) in our department from November 2005 to January 2006 were enrolled in this study. All of them complained of SUI according to the standardization of terminology of lower urinary function from ICS [8]. Our 20-min modified pad test was proposed by Hahn and Fall [6] and modified by Sand and Ostergard [3]. Each patient's bladder was emptied with a transurethral catheter and filled to a bladder volume of 250 ml of water and the strong-desire amount, respectively. The catheter was removed, and then the patient returned to a standing position with a pre-weighed perineal pad placed inside the underwear. The patient was asked to cough 10 times, bear down 10 times, do 10 deep knee bends, jump up and down on the spot 10 times, wash her hands under cold water for 1 min, walk up and down five stairs 10 times, walk in the hall for 10 min, and then return for removal of the pad. The pad was then weighed and the net weight was calculated by subtracting from the original dry weight to achieve a measure of the total urine loss during the 20 min exercise. The activities that the patients underwent were the same in two 20-min pad tests. The pad weight was measured in grams and the accuracy of the scale was 1 g. The positive pad weight result was defined as more than 1 g of leakage [3,4].

After single Foley catheterization to evacuate the residual urine in the patient's bladder, the 20-min pad test by infusion of 250 ml distilled water in the bladder with a rate of 60 ml/min was performed first. After that, each patient received UDS including uroflowmetry in spontaneous voiding, both filling (with a rate of 60 ml H_2O/min) and voiding cystometry with infusion of 35 °C distilled water and stress urethral pressure profile using a two-way No. 9 French flexible Foley catheter with the strong-desire amount in the bladder [9]. The first sensation amount, first desire amount, and strong-desire amount were recorded during filling cystometry. Presence of urodynamic stress incontinence, pressure equalization, ratio of pressure transmission, maximal urethral pressure, urethral closure pressure, and functional urethral length were also recorded. Once the strong-desire amount was infused in the bladder, the transurethral catheter was removed and the second 20-min pad test was performed.

A Life-Tech six-channel urodynamic monitor with computer analysis and Urovision (Urolab Janus System III, Houston, TX, USA) was used. All procedures were performed by an experienced technician, and the data were interpreted by a single observer to avoid bias. The results of the two tests in each patient were analyzed and compared using Pearson's χ^2-test and Wilcoxon's signed-rank test. The latter test was recommended by the ICS to analyze pad test data that was not normally distributed [10]. A P-value of <0.05 was considered statistically significant.

The study was approved by the ethics committee in our hospital and informed consent was obtained from each patient.

3. Results

The mean age of the 83 women with SUI was 53.6 ± 12.6 years, with a mean parity of 2.8 ± 1.5. Fifty-four percent ($n = 45$) of the 83 patients were post-menopausal. The mean strong-desire amount in these 83 women with SUI was 292.4 ± 90.6 ml, while 73.5% ($n = 61$) of the patients had a strong-desire amount larger than 250 ml (Table 1). We further classified the 83 women with SUI into urodynamic stress incontinence (USI), idiopathic detrusor overactivity (DO), and mixed USI/DO groups after UDS. The comparison of the 20-min pad test by infusion of 250 ml of water with the strong-desire amount in the 83 patients is shown in Table 2. In either group or in the total patient population, the sensitivity by infusion of the strong-desire amount in the 20-min pad test had better results than infusion of 250 ml water ($P < 0.001$ and $P = 0.004$, respectively).

Table 1
Age, parity, menopausal status and strong-desire amount during filling cystometry in 83 women with stress urinary incontinence (SUI)

	SUI ($n = 83$)
Age (years)	53.6 ± 12.6
Parity	2.8 ± 1.5
Menopausal status (%)	45 (54%)
Strong-desire (ml)	292.4 ± 90.6
Strong-desire > 250 ml	61 (73.5%)