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Original Scientific Paper

THE RELIABILITY OF URODYNAMIC ASSESSMENT IN CONFIRMATION OF STRESS URINARY INCONTINENCE IN RELATION TO BONNEY TEST

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SUMMARY – According to the International Continence Society, stress (static) urinary incontinence is defined as any involuntary loss of urine on effort or physical exertion, due to which intravesical pressure overcomes urethral pressure, with no detrusor activity. Urodynamic testing accurately assesses the function of the bladder and urethra. The urodynamic assessment includes three tests: cystometry, uroflowmetry and profilometry (determination of urethral pressure profile). Prior to urodynamic assessment, it is mandatory to rule out urinary tract infection since it is an invasive test. Urethral profilometry is a technique that measures pressure in the urethra and bladder at rest, during stressful actions, and during the act of miction. Its main purpose is to evaluate the sphincter mechanism. During the examination, a special catheter is used, which is being slowly pulled out from the bladder neck throughout the urethra, with continuous recording of intraurethral pressure. In addition to measuring urethral pressures, stress urinary incontinence is also very successfully proven by the cough test and Bonney test. If, on forced cough, the urine escapes uncontrollably, and continence is restored by finger lifting the neck of the bladder, the diagnosis of static incontinence is confirmed. At our urogynecologic clinic, urodynamic examination is being routinely performed. In the present study, we included patients previously treated for urinary stress incontinence and compared their results of urodynamic assessment to the results of Bonney test. Of the 43 subjects in whom stress incontinence was proven with Bonney test, we recorded an appropriate profilometry result in 13 cases.

Key words: *Urodynamic assessment; Stress incontinence; Bonney test*

Introduction

According to the International Continence Society (ICS), stress (static) urinary incontinence is defined as any involuntary loss of urine on effort or physical exertion, due to which intravesical pressure overcomes urethral pressure, with no detrusor activity. Urinary incontinence is a common condition that affects millions of people worldwide[1,3]. Urodynamic testing accurately assesses the function of the lower urinary tract[4,5]. Urethral profilometry is a technique that measures pressure in the urethra and bladder at rest, during stressful actions, and during the act of miction. Its main purpose is to evaluate the sphincter mechanism[4,5]. During the

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examination, a special catheter is used, which is being slowly pulled out from the bladder neck throughout the urethra, with continuous recording of intraurethral pressure. Stress urinary incontinence is also very successfully proven by the cough test and Bonney test[4-6]. If, on forced cough, the urine escapes uncontrollably, and continence is restored by finger lifting the neck of the bladder, the diagnosis of static incontinence is confirmed. At our urogynecologic clinic, urodynamic examination is being routinely performed. In this retrospective study, we included patients previously treated for urinary stress incontinence and compared their results of urodynamic assessment to the results of Bonney test. It is important to note that the operational program was greatly reduced during the COVID-19 pandemic period.

Subjects and Material

The study included 43 patients treated at our urogynecologic clinic from January 2017 to December 2021. Patients were grouped according to age. The largest proportion of respondents were in the 60-69 age group (n=19, 44.2%), and only two (4.7%) patients were in the 30-39 and 70-79 age groups each (Fig. 1). The youngest and oldest patients were aged 38 and 75

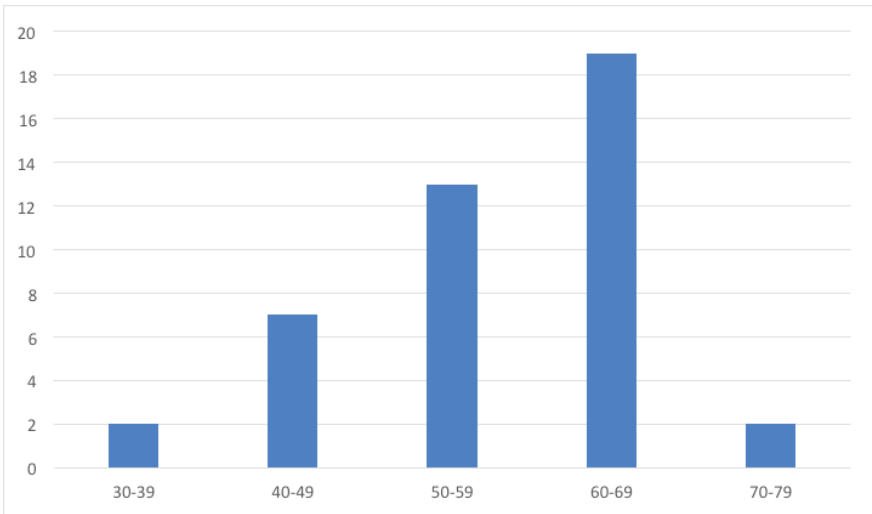

Fig 1. Distribution of subjects according to age groups (years).

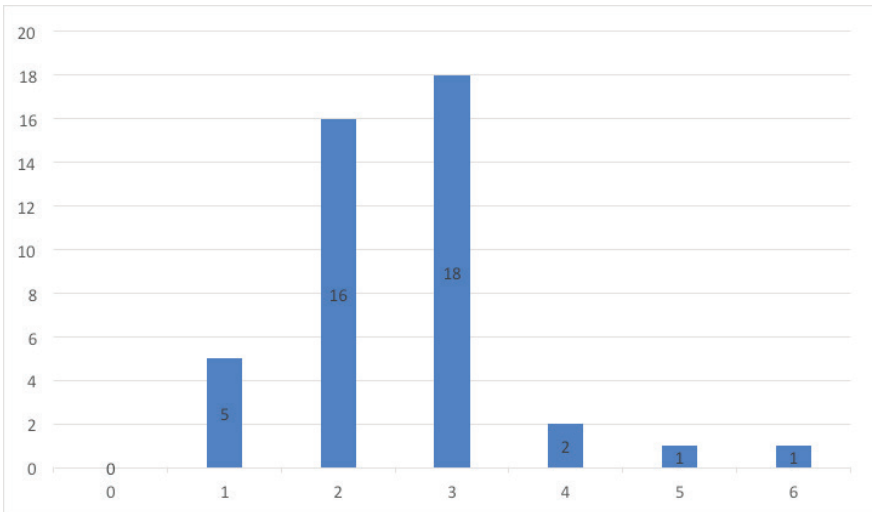

Fig. 2. Distribution of subjects according to parity (number of deliveries).

years, respectively. Patient distribution according to parity showed that most patients had three deliveries (n=18, 41.9%), whereas none of the women was nulliparous (Fig. 2)[2].

All patients underwent complete evaluation that included standardized history and physical examination, urinalysis and urine culture, and finally urodynamic assessment about a month prior to treatment. During profilometry[4], measurements of functional urethral length (FUL) and pressure transfer during cough were assessed, comparing the pressure recorded at mid-urethral portion and in the bladder. If the bladder pressure exceeds the pressure obtained at the mid-urethral portion, the diagnosis of stress incontinence is confirmed. Finally, with a full bladder, Bonney test[7] was carried out, where the escape of urine from the bladder is observed, which, if stopped by finger lifting the bladder neck, also denotes stress incontinence.

Results and Discussion

The subjects were divided according to the FUL, continence status according to coughing test in profilometry assessment, and finally, according to the method of treatment and success of the treatment method itself. According to the FUL, the subjects were divided into 5 groups (Fig. 3). Ten (23.2%) subjects had FUL of 16-20.9 mm, 18 (41.9%) were in the range of 21-25.9 mm, eight (18.6%) in the range of 26-30.9 mm, two (4.7%) in the range of 31-35.9 mm, and five (11.6%) in the range of 36-40.9 mm. Stress incontinence confirmed according to profilometry assessment was found in 5, 14, 4, 1 and 4 subjects from the above FUL groups, respectively. In 13 patients with a history of stress incontinence, we recorded normal result of pressure transfer during cough on profilometry, but the same patients also had a positive Bonney test. Looking at the distribution of such cases (normal profilometry result and positive Bonney test) (Fig. 3), the lowest reliability of profilometry *versus* Bonney test was found in the group of subjects with FUL of 16-20.9 mm, i.e., five out of ten (50%) subjects. It is also important to note that we had two patients with proven stress incontinence on profilometry but negative Bonney test. Due to the history of complaints, both these patients underwent treatment for stress incontinence, one by Burch colposuspension[8], and the other one by paraurethral hyaluronic acid injection[9], and both experienced significant subjective improvement after treatment.

The treatment methods used included functional magnetic stimulation[10], placement of mini[11] or standard[12] suburethral sling, anterior colpoplasty[13], periurethral hyaluronic acid injections[9], and Burch colposuspension[8]. The great majority of the 43 study patients (60.5%) were treated with the suburethral sling procedure. Looking at the cure rate, we found that the

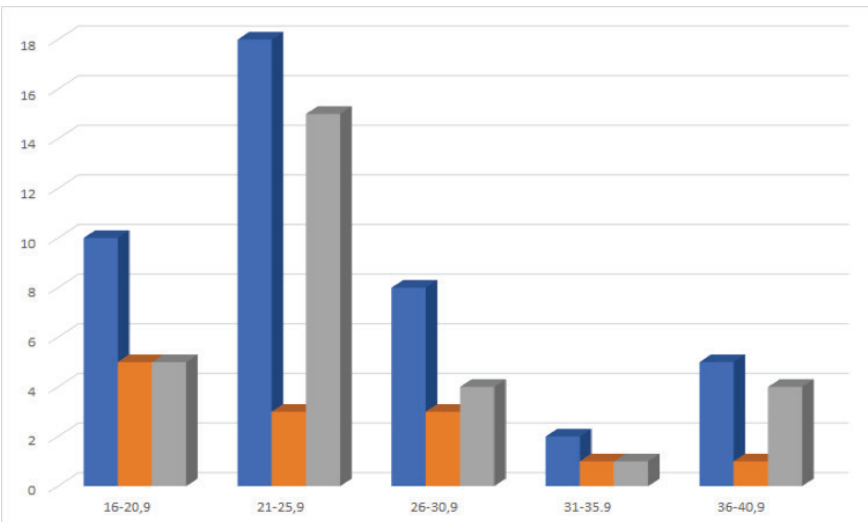

Fig. 3. Distribution of subjects according to urethral length (mm, blue bars), incontinence on coughing test in profilometry assessment (gray bars) and profilometry/Bonney test discrepant findings (women with normal profilometry results but positive Bonney test, orange bars).

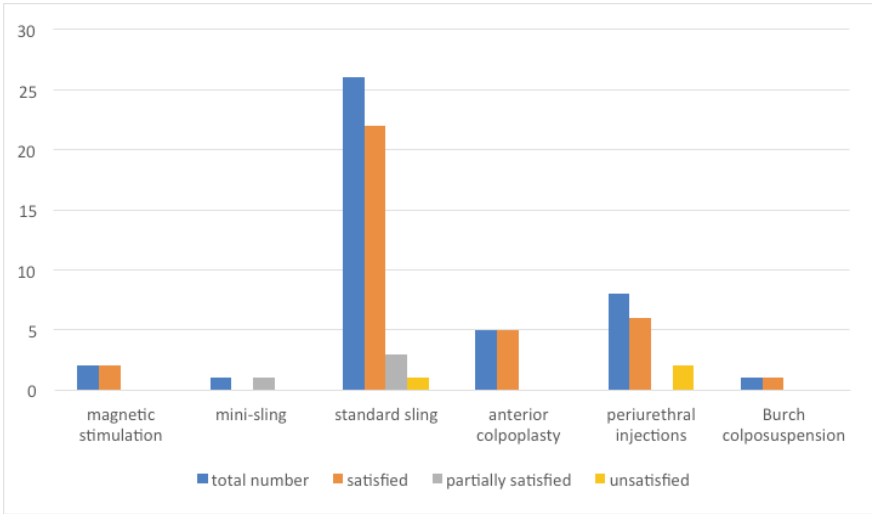

Fig 4. Distribution of subjects according to cure by particular methods.

most successful method was anterior colpoplasty, with all these patients (n=5) reporting continence recovery after surgery. Figure 4 shows cure rate for each method. Study patients were offered to express themselves as follows: fully satisfied, partially satisfied, or dissatisfied with the treatment. In the suburethral sling method group with the largest number of patients, complete satisfaction was recorded in 22 of 26 (84.6%) patients, partial satisfaction in three (11.6%) patients, whereas only one (3%) patient was dissatisfied with the treatment. In two (7.7%) cases, treatment with suburethral sling led to *de novo* overactive bladder, which is a known postoperative complication, with a previously reported incidence of about 9%[14].

The method of periurethral injection of hyaluronic acid proved to be the least successful procedure with 6 out of 8 (75%) subjects being satisfied with the treatment, whereas the remaining two patients expressed dissatisfaction with the treatment. Those were treated in the second act with suburethral sling placement and eventually became fully satisfied with the treatment (they were not included in the group of those primarily treated with suburethral sling). In one patient treated with the suburethral sling method, intraoperative bladder perforation occurred and mesh repositioning with subsequent satisfaction was eventually achieved[15].

Conclusion

Based on the results obtained in this study, the diagnosis of stress urinary incontinence is more accurately achieved with Bonney test in comparison to the urodynamic method of profilometry. We emphasize that performing Bonney test is much simpler and more affordable in everyday practice compared to a significantly more invasive method of profilometry. In order to confirm the results obtained, further research is needed.

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Sažetak

POUZDANOST URODINAMSKE OBRADE U POTVRDI STRESNE INKONTINENCIJE MOKRAĆE U ODNOSU NA BONNEY TEST

Ž. Blažinkov, I. Krištofić, I. Jandrić, M. Blažinkov, B. Lovrić, D. Pavlović, M. Čebohin i *S. Marinić*

Stresna (statička) inkontinencija mokraće definira se prema ICS-u kao neželjeno otjecanje mokraće kroz uretru istodobno s porastom intraabdominalnog tlaka zbog kojeg intravezikalni tlak nadvlada tlak u uretri, uz odsutnu aktivnost detruzora. Urodinamskom obradom precizno se procjenjuje funkcija mokraćnog mjehura i mokraćne cijevi. U urodinamsku obadu ubrajajmo tri metode: cistometriju, mikciometriju (*uroflow*) i profilometriju (određivanje profila uretralnog tlaka). Prije urodinamske obrade moramo uvijek isključiti infekciju mokraćnih kanala, jer se radi o invazivnoj pretrazi. Profilometrija uretre je tehnika kojom mjerimo tlak u uretri kod mokraćnog mjehura u mirovanju, tijekom stresnih radnja i samog akta mokrenja. Osnovna joj je namjena ispitivanje sfinkterskoga mehanizma. Pri pregledu rabi se specijalni kateter koji se malom brzinom povlači od vrata mjehura prema distalno uz kontinuirano bilježenje intrauretralnoga tlaka. Uz mjerenje tlakova uretre stresna inkontinencija mokraće se vrlo uspješno dokazuje i testom kašlja, odnosno Bonney testom. Ako kod forsiranog kašlja mokraća nekontrolirano otječe, a podizanjem vrata mokraćnog mjehura prstima ispitanica uspijeva zadržati mokraću u mjehuru, radi se o statičkoj inkontinenciji. U OB "Dr Josip Benčević" pri uroginekološkoj ambulanti radi se urodinamsko ispitivanje. U ovo istraživanje uključili smo samo ispitanice s liječenom stresnom inkontinencijom mokraće te smo usporedili njihove rezultate na urodinamskoj obradi u odnosu na rezultate Bonney testa. Od 43 ispitanice kojima smo stresnu inkontinenciju dokazali Bonney testom u 13 slučajeva zabilježili smo uredan nalaz profilometrije.

Ključne riječi: *Urodinamska obrada; Stresna inkontinencija; Bonney test*