

Urinary incontinence – laboratory and functional examination

(Niedotrzymanie moczu – badanie laboratoryjne i czynnościowe)

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Abstract – The authors have performed a thorough analysis of laboratory and functional examinations used in the diagnostics of urinary incontinence. They have discussed in detail the Bridge Fluid Test, cough test, Sand's test, pad test, etc. Yet another tool that is very useful in assessing the disorders is a micturition diary. This diary is especially helpful in diagnosing polyuria (excessive urine production) and night polyuria (excessive urine production during sleep). The authors have emphasised the basic elements of keeping such a diary. Furthermore, selected urodynamic tests have been discussed at length.

Key words – urinary incontinence, laboratory tests, functional examinations.

Streszczenie – Autorzy dokonali szczegółowej analizy badań laboratoryjnych i czynnościowych służących diagnostyce nietrzymania moczu. Omówili szczegółowo m.in. Bridge Fluid Test, test kaszlowy, próbę Sanda, test podpaskowy. Jeszcze jednym niezwykle użytecznym narzędziem umożliwiającym ocenę zaburzeń jest dzienniczek mikcji. Dzienniczek mikcji jest szczególnie przydatny w ocenie poliurii (nadmiernej produkcji moczu) oraz nocnej poliurii (nadmiernej produkcji moczu podczas spoczynku nocnego). Autorzy zwrócili uwagę na zasadnicze elementy prawidłowego prowadzenia dzienniczka. Dokonano także omówienia wybranych badań urodynamicznych.

Słowa kluczowe – niedotrzymanie moczu, badania laboratoryjne, badania czynnościowe.

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- A. The idea and the planning of the study
- B. Gathering and listing data
- C. The data analysis and interpretation
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I. LABORATORY URINALYSIS

This test should be performed in every single case. For the initial analysis, it is sufficient to perform a dipstick test in order to rule out:

- Blood in urine;
- Urinary system infections, (should the result be positive, the urine culture test should be performed);
- Glucose in urine.

It has to be added that, despite the fact urinary incontinence is accompanied by urinary system inflammations more frequently than other ailments, they are not always the case [1-8].

II. FUNCTIONAL EXAMINATION

Another element of initial diagnostic treatment is performing the selected functional examination [1,2,4-10]:

- Bridge Fluid Test – this test is used to assess the bladder neck efficiency. A catheter is inserted to the bladder that contains between 150-200 ml of fluid and then it is slowly retracted until the fluid flow stops. Then, the catheter is advanced towards the bladder by around 5 mm. If during a pressure rise in the abdomen (coughing), there is fluid flow through the catheter, this means the efficiency of bladder neck closure apparatus is decreased.
- Cough test (pessary test, Bonney's test) – in consists in the patient coughing with a full bladder. If the urine leaks, a pessary is inserted into vagina and the patient coughs again. The doctor may also insert a finger into the vagina and apply pressure to its front wall without pressurising the urethra. If the urine does not leak during coughing, the test is positive, which means an operation is likely to improve the patient's condition.
- Sand's test. The system used for this test is composed of a part that is used to transport fluid to the bladder linked via a T-connector with a water manometer (CVP). The original idea is to infuse the liquid into the bladder while the patient is upright. After the bladder is filled with 250 ml of liquid, the pressure in the bladder is checked. The pressure exceeding 15 cm head of water signifies the overactive detrusor – the wall of the bladder.
- Pad test – according to the recommendations of International Continence Society (ICS), this test should last one hour. The examined patient is to drink 500 ml of liquid and wait 30 minutes. Then she is to run as well as climb and descend stairs. Starting at minute 45 of the test, she takes up a special exercise programme: sits down and stands up 10 times, coughs 10 times, runs in place for one minute, picks up items from the floor, washes her hands under running water. The menstrual pad is weighed after 60 minutes. If the pad weight increases by < 2 g – it is considered to be dry. If it is 2 to 10 g – it is a mild urine leakage. With 10 to 50 g rise, the urine leakage is deemed intensive. Over 50 g rise means the leakage is very intensive. A variety of this test is a home pad test. It lasts 12 hours. During the test, the patient drinks a defined amount of fluid, and with

15 minutes till the end of the test, she performs a series of exercises.

Yet another variety of the pad test is the so-called *Nappy Test*. The modification here consists in measuring the electric conductivity of the pad after the test. Before the test, the pad is soaked in dry electrolyte. This test is hardly repeatable and rarely performed.

- Ice-cold water test – it consists in filling the bladder with 0°C water in order to trigger an overreaction of the detrusor and observe prospective leakage of urine “bypassing the ureter”, which points to overactive detrusor.
- In the era of common access to urodynamic tests, the aforementioned tests have only a historic significance [4-10].

III. MICTURITION DIARY

Yet another very successful tool used to assess the disorder is a micturition diary. The patient usually takes down observations for three days, logging the time of getting up and going to bed, the daily fluid consumption and the volume of urine. The patient can be asked to register the urgencies as well, but the doctor must remember not to overwhelm her with too complex information to log. Micturition diary is useful especially in the assessment of polyuria (excessive urine production) and night polyuria (excessive urine production during sleep) [9-11].

When keeping the micturition diary, one must remember that:

- The diuresis should remain in the range of 1100 to 1800 ml/day,
- The correct urination frequency during the day is below 8 times, and at night – no more than twice,
- The average volume of urine from a single urination should remain in the range of 200 to 300 ml, and maximum volume – 400 to 600 ml.

According to the guidelines of the Polish Gynaecological Society, , the next phase of diagnostics is specialist treatment. PGS states in its recommendations: “specialist treatment is reserved for procedures allowing to assess the patient's clinical condition thoroughly and multidisciplinary, thus precisely defining the cause of urinary incontinence. This type of treatment makes it possible to optimise therapeutic procedures. An integral part of specialist treatment is an urodynamic study, which is constituted by cystometry and urethral pressure profile. The assessment of

the genital statics and the intensity of atrophic changes to vagina and pudendum should be performed again” [11]

IV. URODYNAMIC STUDY

Urodynamic study (UDS) is a test which allows one to maximise the safety of the decision to have a surgery on the patient. Its main advantages include objectivity, unambiguity and repeatability for incontinence type determination. Furthermore, urodynamic studies are recommended after conservative treatment brings no recovery, and also in cases of incontinence triggered by neurological disorders [1,4,6-8].

Basic tools [2,4-6]

Uroflowmetry is a natural, non-invasive study used to assess the urine flow. It can determine the following parameters: urine volume, maximum and mean urethral flow, urine retention after micturition. Low urethral flow in women with incontinence points to the handicapped functioning of detrusor, but it might as well indicate a bladder outlet obstruction. In order to rule it out, a pressure-flow study should be made. Furthermore, multiple rapid increases on the chart point to involuntary cramps appearing in cases of overactive or unstable detrusor.

Filling cystometry is a test that makes it possible to determine the incontinence type with high precision. During this test, fluid is steadily supplied to the bladder, and the patient is to inform the physician when the feeling of urinary urgency appears. During this test, the volume of fluid in the bladder is measured at the moment of the first micturition. The maximum capacity of the bladder is also assessed. The measurements taken both in the rectum and bladder and they provide information on abdominal and bladder pressure. After an electronic calculation, the detrusor pressure is yielded, determining the detrusor activity. Temporary pressure increase after coughing or changing body position is related to the cramps of detrusor and indicates that it is instable.

Micturitional cystometry is a test that yields information on micturition pressure of detrusor and urine flow: low detrusor pressure might stem from its low activity, and high pressure might be a result of prior surgical attempts to address urinary incontinence.

Urethra functionality evaluation

Urinary incontinence diagnostics also includes tests aimed at a thorough examination of the urethra functionality. These include [6-9]:

- *Urethral pressure profile (UPP)*, i.e. the measurement of the length of the urethra, urethral pressure, and

the maximal and static closure pressure, thanks to which instability of urethra and damage to urethral sphincter can be determined.

- *Leak point pressure (LPP)*, used to assess the urethral sphincter functionality
- *Urethral electric conductance (UEC)*, used to determine the motoric function of urethra

These studies are not performed as a routine in urinary incontinence diagnostics.

Ambulatory urodynamics (AUDS)

AUDS is applied in cases of women with symptoms of both stress incontinence and urgency incontinence, whose standard cystometry is normal. This is an ambulatory study lasting several hours. It consists in registering the pressure while the bladder is gradually filled in a natural way. It makes an objective assessment of the lower urinary tract possible [6].

Video urodynamics (VUDS)

This is an urodynamic examination with an ultrasound or x-ray test applied simultaneously in order to reflect anatomical changes. This study is reserved for patients in cases of whom, for whatever reasons, the incontinence type cannot be determined using traditional cystometry. Or whose surgical treatment brought no effects. On the basis of the video urodynamic study results, stress incontinence, urge incontinence, or mixed incontinence (the blend of the two) can often be determined.

The diagnostics of lower urinary tract disorders is a multiphase process. It involves getting the medical history, often accompanied by micturition diary, as well as questionnaires and clinical tests, including gynaecological examinations. An urodynamic study yields valuable and precise data, so it should be treated as a complementation of the diagnostic methods [9-13].

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