THE USE OF THE MICROTRANSDUCER CATHETER IN DIAGNOSIS OF VESICO-URETHRAL DISORDERS

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Summary: The Authors report their own results on the use of the microtransducer catheter in diagnosis of vesico-urethral disorders in 60 patients.

The parameters concerning the static and dynamic UPP are discussed in order to define the meaning of such values in the etiopathogenetic arrangement of the semiology.

INTRODUCTION

The bladder and the urethra form a functional unit in which the former is a container and the latter the outlet duct or biological valve. When the pressure at each point of the urethra and at any moment, under any stress condition or in different positions, is the same or exceeds the pressure inside the bladder, the urine cannot flow through the urethra. Therefore, the intravescical pressure must exceed the highest urethral pressure so that the urine may flow through the urethra.

The urethral pressure profile (UPP) consist in establishing the pressure present at several points of the urethra, from the neck to the external urethral meatus. It has been shown that the measuring of the UPP with a microtransducer catheter provides better results than the methods previously used ([1]). The measuring obtained with other techniques gives diffierent results about repetition (measuring obtained on the same patient and on the same occasion) and reproducibility (measuring carried out on the same patient and on different occasions) pointing out, by doing so, the greater reliability of the microtransducer catheter method.

This technique makes it possible to get continual transcriptions of the intra-vesical and intra-urethral pressure in any anatomical point of the urethra, at any moment and under any stress condition of change of position of the patient ([2, 3, 4, 5]).

The transcriptions give accurate information about the intra-urethral and intravesical pressure and the dynamic correlations between the pressures transcripted at the same time in these two organs too ([6, 7, 8, 9]). The accuracy of such pressure transcriptions in healthy patients and those suffering from urinary incontinence provides us with a new diagnostic dimension in the treatment of urinary incontinence. Patients suffiering from urinary incontinence due to stress very often show an alteration in the capacity of transmission of the abdominal pressure to the urethra, due to an anomalous abdominal position of the urethra and of the urethral-vesical connection.

When it has been decided to operate, it must be kept in mind that the main purpore is to restore the natural and original intra-abdominal position of the urethra, in order to make the capacity of transmission of the abdominal pressure easier, without breaking into the structure ([10]).

By planning an operation for urogynaecological pathology, we must take into account not onl hte prevailing pathology but also the pathological conditions concurring in causing an invalidating situation. Sur-

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gical tactics can be articulated both on the basic operation and on surgical treatments aimed at the reinstatement of the anatomic and functional normality of the pelvic organs.

MATERIAL AND METHODS

Our study was carried out on 60 patients, 50 of whom were examined because of pelvic statics deficit and/or urinary incontinence, and 10 were examined as "control group". The common age group studied was the middle aged (age 51.9) with a range between 35 and 76, and a parity of 1.6. The average age concerning the beginning of menarche is 13.9, the weight 63.4 kg and height 164.3 cm. The average age of the beginning of menopause is 48.9.

Table 1 shows the anatomic-clinic-urodynamic division of the enumeration of cases taken into account.

Table 1. – *Vesico urethral disorders: distribution of the cases.*

Stress incontinence		30
– stress+pelvic statics deficit	10	
– isolated stress incontinence	20	
Mixed incontinence		5
Urge incontinence		5
Pelvic statics deficit		10
Control group		10

All the patients were subjected to a complete urodynamic examination including cystomanometry, urofluxometry, static and dynamic, urethral pressure profile, by gas perfusion and microtransducer catheter method. The urodynamical examinations were carried out with DISA apparatus provided with a 6 channel polygraph and with a modular system consisting of:

- disk fluxometer;
- quantitative electromyograph with sound signal;
- two pressure gauges (Statham P_{23} Db transducer) with electronic deduction of the two measuring;
- pressure gauge connected to an infusion pump CO_2 and linked to a scaled catheter for urethral pressure profile Charrière 8.

The access into the bladder was transurethral with two " feeding tubes " of 6 Charrière gauge, one of which was used for the vesical filling and the other for the endovesical taking of pressure.

A small endorectal probe made the endoabdominal pressure taking easier. The vesical filling was carried out by dropping, and at mean velocity, between 10 and 100 ml/m, with distilled physiological solution H_2O. During the cystomanometry performance the patients were subjected to stimulation tests such as " cough test ", Valsalva test and exertion test. Urofluxometry always followed the cystomanometry and then the reckoning of the urethral pressure profile. It was carried out with two techniques:

1) by contractility at constant speed through the mechanical arm of the little catheter 8 Charrière and constant infusion of CO_2 through pump;

2) with microtransducer catheter.

Technique: After dewatering any vesical residue the microtransducer is inserted through the urethra so that both microtransducers may be, inside the bladder, set sideways, (at three or nine).

The catheter is fastened to a clamp running along a mechanical arm at the required speed. The mechanical arm is adjustable in height so that the catheter may be fastened at the height of the urethra to be examined.

Pressure transcriptions are performed by the distal microtransducer (intra-vesical pressure) and by the proximal microtransducer (intraurethral pressure). The polygraph accomplishes an electronic deduction of the vesical pressure from the urethral one (urethral closing pressure).

RESULTS

In determining the global urodynamic evaluation, we directed our interests particularly to the parameters concerning the static and dynamic UPP in order to define the meaning of such values in the etiopathogenetic arrangement of the semiology suffered by the examinded patients.

In table 1 the control group has been compared with the various pathological groups. By studying the data in list 2, we can see how the values of the static and dynamic UPP, which may be compared (UFL and UCP), are superimposing in the control group.

A further study of table 2 shows how alla the static parameters of the "pathological groups" are inferior to the ones of the control group. Furthermore, the dynamic parameters (performed with a mi-

crotransducer catheter) of the control group are superior to the ones of the groups suffering from stress and mixed urinary incontinence.

Finally, by comparing the dynamic parameters of the group of patients suffering from pelvic statics deficit with those belonging to the group of women suffering from stress incontinence, some variance is to be pointed out. This variance does not evist in the comparison of the static parameters of the same groups.

If, from the group of 30 patients suffering from stress incontinence we form two subgroups with reference to association or not with pelvic statics deficit, it results that the values of the static and dynamic parameters of the stress pelvic statics deficit subgroup are a slightly lower than those of the incontinence group.

Moreover, from the comparison between the issues of the pelvic statics deficit group and those of the subgroup in which such a situation is connected to urinary incontinence, we can see how the values of the static parameters of the two groups of patients taken into account and examined are superimposing; it is important to notice how the values of the dynamic parameters are inferior in the group in which the two pathologies are linked (list 4).

CONCLUSIONS

By examining the results of our study we can draw some considerations; we think them interesting, in static and dynamic UPP parameters in the several urogynaecological pathologies above-mentioned.

First of all we must acknowledge the inherent limits of values achievable from "usymptomatic" patients and subjects suffering from various urogynaecological pathologies. The choice of a group of so-called "unsymptomatic" patients as a control group is a method not free from criticism.

This is due to some evidence from a large body of Literature on casual urinary incontinence in more than 50% women who do not seem to suffer from such pathology.

By studying our issues, it results that the closure urethral pressures are inferior in the patients suffering from stress and mixed urinary incontinence to the ones of the control group; the comparison between patients suffering from pelvic statics deficit and patients who, in addition, suffer from stress incontinence shows no relevant or important variance or difference.

Finally, if we observe the percentage of the transmission ratio in groups of patients suffering from stress and mixed urinary incontinence we can notice a linear decrement from the vesical neck to the external urethral meatus.

On the contrary, the control group shows a higher percentage of transmission of abdominal pressure to the proximal urethra and an accentuation of this ratio in the central section of the urethra. Such differences in the transmission percentages is present also in the group of patients suffering from isolated pelvic statics deficit and the ones suffering from stress incontinence in addition to the previous pathology. Therefore, if the static UPP in insolated stress urinary incontinence and in the mixed one has a good diagnostic value, in those connected to utero-vaginal prolapse it shows limits.

The values found in the latter group of patients are not much inferior to the ones belonging to the group of patients suffering from only pelvic statics deficit.

On the contrary, the dynamic UPP seems to have a very good diagnostic correspondence; so we must keep it in mind above all for cases of pelvic statics deficit connected to stress urinary incontinence.

Mixed urinary incontinence, because of its component concerning the cervical-urethral sector, is best examined with the dynamic UPP. To sum up, our study suggests that an efficient transmission of abdominal pressure to the three proximal fourths of the urethral functional length is essential for the maintenance of the urinary continence.

Anyway, incontinence is brought on by the various functional characteristics interacting and not by a single alteration in urethral physiology. According to Raz "female continence is due to a force balance and to a series of factors connected to the length of the urethra, to the anatomic position, to the closing pressure and to the transmission capacity of the intra-abdominal pressure into the urethra. Some of these factors can be compromised and other factors can make up for this functional injury. A bad functional length can be offset by a good anatomical position and by good pressure of urethral closing while an incorrect anatomical position can be offset by good closing pressure any by good functional length.

BIBLIOGRAPHY

1) Hilton P., Stanton S. L.: *Br. J. Obst. Gyn., 90*, 919, 1983.
2) Hilton P., Stanton S. L.: " Urethral pressure measurement by microtransducer: an analysis of variance ". Proceedings of the International Continence Society IIth Annual Meeting Lund.
3) Asmussen M., Ulmsten U.: *Acta Obst. Gyn. Scand., 54*, 385, 1975.
4) Asmussen M., Ulmsten U.: *Acta Obst. Gyn. Scand., 55*, 167, 1976.
5) Enhoraing G.: *Acta Chir. Scand.*, Suppl., *276*, 1, 1961.
6) Ulmsten U.: " A new technique for simultaneous urethrocystometry including measurements of the urethral pressure ". Proceedings of the International Continence Society 5th Annual Meeting, Glasgow.
7) Onnis A., Valente S., Ceci G. P.: " Patologia del sistema di supporto pelvico ed incontinenza urinaria ". In: *Ginecologia ed Ostetricia*, Monduzzi Ed., 1981, Bologna.
8) Kujansuu E.: *Int. J. Gyn. Obst., 21*, 353, 1983.
9) Valente S., Fabris F., Ceci G. P.: " Urodinamics in gynaecology clinical experience ". Atti I Internat. Congress of Obst. and Gyn., Peking, 18-21 June, 1985.
10) Hilton P., Stanton S. L.: *Br. J. Obst. Gyn., 90*, 934, 1983 a.
11) Raz S.: " Female Urology Post-Graduate Course ". A.U.A. Annual Meeting, Washington D.C., 1978.