

## VALSALVA LEAK POINT PRESSURE: VARIABILITY OF REPETITIVE MEASUREMENTS WITH DIFFERENT METHODOLOGIES

### Aims of Study

Different methodologies have been used to perform Valsalva Leak Point Pressure (VLPP) measurements. Patients can be placed in the urogynaecological or in the upright position, pressures can be set at 0 at the level of the symphysis or into the bladder and measured as total vesical pressures (VLPP<sub>tot</sub>), or as increases over baseline abdominal pressure ( $\Delta$ VLPP). There are only sparse data on the variability of repetitive measurements with different methodologies. The aim of this study was to investigate the reliability of current procedures used in performing VLPP measurements and to detect possible changes in the classification of Stress Urinary Incontinence (SUI).

### Methods

Fifteen patients affected by SUI underwent urogynaecological assessment of vaginal profile according to the Halfway System Classification; and VLPP examination on two different days. During the first evaluation (time 1), bladders were filled to a volume of 200 ml of normal saline using an 8Fr urethral catheter. VLPP examination consisted of: (A) patients in the urogynaecological position with the pressures set at zero into the bladder; (B) patients in the upright position with the pressures set at zero into the bladder; (C) patients in the urogynaecological position with the recording of VLPP<sub>tot</sub> and  $\Delta$ VLPP; (D) patients in the upright position with the recording of VLPP<sub>tot</sub> and  $\Delta$ VLPP. During the second evaluation (time 2), these VLPP procedures were accurately repeated.

Using accepted criteria, patients were classified according to VLPP values, with a cut-off of  $\leq 60$  cmH<sub>2</sub>O to distinguish intrinsic sphincter deficiency from urethral hypermobility. In the absence of urinary leakage, the maximum bladder pressure (pVes) obtained during the Valsalva maneuver was recorded.

Reliability of the procedures used in the study was determined by evaluating the coefficients of variation (CV<sub>s</sub>) of VLPP values and of maximum pVes, in time 1 and 2. The Cohen's K Test of agreement was applied for the comparison of SUI classification during the evaluations in time 1 and 2.

### Results

64.3% of patients had a positive VLPP during all the procedures in time 1 and 71.4 % of patients had a positive VLPP during all the procedures in time 2.

VLPP<sub>tot</sub> and maximum pVes values obtained in the upright position (D procedure), showed a lower variability (CV=14.3) than those obtained with the other procedures (Table 1).

Table 1. Reliability of VLPP and maximum pVes values obtained during different procedures in times 1 and 2

Procedures	Time 1	Time 2	Change in mean	Typical error	Limits of agreement	CV (%)
	VLPP/pVes (cmH <sub>2</sub> O)	VLPP/pVes (cmH <sub>2</sub> O)				
(A)	83.5 $\pm$ 33.7	104.5 $\pm$ 34	12.62	16.99	47.07	36.6
(B)	79.3 $\pm$ 34.1	81.5 $\pm$ 44	-0.23	10.96	30.36	38.9
(C)	92.2 $\pm$ 39.8	99.3 $\pm$ 32	7.07	13.57	37.59	38.8
(D)	118 $\pm$ 42.3	125 $\pm$ 37.3	6.43	13.29	36.80	14.3
$\Delta$ VLPP urog.	81.2 $\pm$ 40.6	88.4 $\pm$ 35	7.14	19.17	53.10	64.9
$\Delta$ VLPP uprig	73.8 $\pm$ 37.5	86.9 $\pm$ 38	13.07	16.84	46.66	29.3

The coefficient K ranged from 0.62 (moderate agreement) in the urogynaecological position with the recording of VLPP<sub>tot</sub>, to 1 (very good agreement) in the upright position with

pressures set at zero into the bladder (Table 2). If we consider  $\Delta$ VLPP values, a very good agreement was obtained when the test was performed in the upright position.

Table 2. Cohen's K test in SUI classification during different procedures in times 1 and 2

Procedures	Time 1 VLPP $\leq$ 60 cmH <sub>2</sub> O (N. of pts)	Time 2 VLPP $\leq$ 60 cmH <sub>2</sub> O (N. of pts)	Agreement	K
(A)	3	2	good	0.74
(B)	4	4	very good	1
(C)	4	2	moderate	0.55
(D)	1	0	good	0.62
$\Delta$ VLPP urogyn.	3	6	moderate	0.55
$\Delta$ VLPP upright	4	4	very good	1

### **Conclusions**

This preliminary study indicates that the VLPP measurement in the upright position with the recording of VLPP<sub>tot</sub> is the most reliable of all procedures. This may be due to the weight of the patient which, in the upright position, can lower the efficiency of the sphincter and induce urinary leakage in a reproducible manner. For the same reason, the upright position seems to be responsible for good agreement in the classification of SUI, both in terms of VLPP<sub>tot</sub> and  $\Delta$ VLPP.