

ELECTROPHYSIOLOGICAL STUDIES OF THE FEMALE PELVIC FLOOR IN STRESS URINARY INCONTINENCE: IS THE INTENSITY OF INCONTINENCE RELATED TO LOCAL NEUROLOGICAL DAMAGE?

Hypothesis / aims of study

Alterations of pudendal and urethral innervations have been identified in women with stress urinary incontinence (SUI) (1, 2). Alterations have not been associated with the severity of the urinary loss. Some authors suggest that neurological abnormalities in the urethra can be evidenced equally in patients with urinary leakages and in normal volunteers with equivalent age and parity (3). This study has the objective to investigate the urethral sensory threshold and urethro-anal reflex latency in patients with SUI and to verify the significance of these electrophysiological parameters as a tool for the quantification of the urethral function activity and degree of incontinence.

Study design, materials and methods

The study was in accordance with the Institutional Ethics Committee. A prospective study was accomplished in 60 women, being 37 with SUI (mean \pm SD 56.1 \pm 13.0 years old, range 31 to 78; 2.9 \pm 2.0 deliveries, range 0 to 9), and 23 normal volunteers (mean \pm SD 43.8 \pm 11.2 years old, range 24 to 66; 1.8 \pm 1.1 deliveries, range 0 to 4). These SUI patients were divided according to the severity of the urinary loss, established by the Valsalva Leak Point Pressure (VLPP), having 60 cmH₂O as the cut off value. The results between the two different VLPP groups were compared to the control. Since there were differences in the ages ($p < 0.001$) and total parity ($p = 0.02$) among the groups, the comparison was accomplished between matched age and parity groups. The urethral sensory threshold corresponded to the smallest energy necessary for perception, in miliamperes (mA) searched by the method of limits. This test and the latency of the urethro-anal reflex, in milliseconds (ms), were accomplished by means of transurethral ring electrode stimulation (Medtronic 9021L0111) and peri-anal surface electrodes recordings. For the comparative study we used the test of Kruskal-Wallis. The significance level was 5% (< 0.05).

Results

The results from comparison between groups with similar age and parity levels are discriminated in tables 1 and 2, respectively.

Table 1: Results of the urethral sensory threshold and urethro-anal reflex latency in control and SUI groups with equivalent ages.

Electrophysiological test	CONTROL GROUP	SUI VLPP (> 60 cmH ₂ O)	SUI VLPP (< 60 cmH ₂ O)	P VALUE
	A	B	C	
Urethral sensory threshold (mA)	3.0 \pm 1.0 (1.6-4.4) (n=13)	3.5 \pm 1.8 (1.6-7.6) (n=16)	4.7 \pm 2.3 (2.0-9.0) (n=17)	0.08
Right urethro-anal reflex latency (ms)	55.6 \pm 4.4 (47.2-2.7) (n=15)	65.4 \pm 9.4 (47.2-78.4) (n=17)	62.5 \pm 8.4 (53.2-78.0) (n=18)	0.007 a x b < 0.01
Left urethro-anal reflex latency (ms)	56.1 \pm 5.9 (45.6-72.0) (n=15)	62.0 \pm 8.6 (47.2-78.4) (n=16)	62.6 \pm 7.8 (54.0-78.0) (n=16)	0.02 a x c < 0.05
Age (years)	49.5 \pm 9.1 (38-66)	54.6 \pm 16 (31-77)	57.1 \pm 11.2 (35-78)	0.21

Table 2: Results of the urethral sensory threshold and urethro-anal reflex latency in control and SUI groups with equivalent parities.

Electrophysiological test	CONTROL GROUP A	SUI VLPP (>60 cmH ₂ O) B	SUI VLPP (< 60 cmH ₂ O) C	P VALUE
Urethral sensory threshold (mA)	3.0 ± 0.9 (1.6-4.2) (n=14)	3.5 ± 1.8 (1.6-7.6) (n=16)	4.7 ± 2.3 (2.0-9.0) (n=17)	0.08
Right urethro-anal reflex latency (ms)	53.8 ± 3.4 (47.2-60.0) (n=15)	65.4 ± 9.4 (47.2-78.4) (n=17)	62.5 ± 8.4 (53.2-78.0) (n=18)	0.0003 a x b < 0.001 a x c < 0.01
Left urethro-anal reflex latency (ms)	55.4 ± 5.7 (45.6-72.0) (n=15)	62.0 ± 8.6 (47.2-78.4) (n=16)	62.6 ± 7.8 (54.0-78.0) (n=16)	0.005 a x b < 0.05 a x c < 0.01
Parity (number of deliveries)	2.4 ± 0.6 (2-4)	3.5 ± 2.7 (0-9)	2.7 ± 1.2 (0-5)	0.43

Interpretation of results

There was no difference in the average of the urethral sensory threshold among the groups, although the results suggest a tendency to higher values as the urinary incontinence becomes more serious. The urethro-anal reflex average latency was higher on both sides in the incontinent patients when compared with normal volunteers, although no differences were found between the groups with VLPP above or under than 60 cmH₂O.

Concluding message

A delay in the urethro-anal reflex latency was found in women with SUI and also a tendency to progressive increase of the urethral sensory threshold. These alterations were not correlated to age or parity. Thus, abnormalities of the urethral innervation may play a role in the cause of stress urinary incontinence. The clinical implications allowing different therapeutic approaches still have to be determined. These electrophysiological parameters were unable to identify the degree of urinary loss.

References

1. Neurophysiological abnormalities in genuine female stress urinary incontinence. *Br J Obstet Gynaecol* 95: 705-10, 1988.
2. Sacral evoked potentials in normal women and in women with stress incontinence. *Neurourol Urodyn* 6: 321-4, 1987.
3. Denervation and reinnervation of the urethral sphincter in the etiology of genuine stress incontinence: an electromyographic study. *Br J Obstet Gynaecol* 100: 750-3, 1993.

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