

“BLADDER ELECTRICAL PERCEPTION THRESHOLD TEST” TO PREDICT THERAPY OUTCOME IN PATIENTS WITH URINARY RETENTION, TREATED WITH BETHANECHOL.

Hypothesis / aims of study

Impaired detrusor contractility with urinary retention can result from a broad range of pathological conditions. One of the treatment schedules include subcutaneous (SC) bethanechol to restore bladder emptying in such patients, but treatment success is highly variable. This may be due to insufficient diagnostic differentiation capabilities by the currently available tests, leading to inadequate patient selection procedures. Although an adequate voiding contraction largely depends on the motor function of the lower urinary tract, afferent feedback is mandatory to maintain the contraction for a complete bladder emptying (1).

The functional status of the bladder afferent nervous system can be evaluated by the bladder electrical perception threshold (B-EPT), which in healthy volunteers decreases after SC injection of bethanechol (2). This preliminary study investigates the immediate effect of bethanechol on the B-EPT and evaluates its role in predicting treatment outcome in patients with impaired contractility detrusor with urinary retention.

Study design, materials and methods

Twenty patients (55 ± 18 years) with urinary retention and cystometrically verified impaired detrusor contractility were studied. The B-EPT was determined with square wave pulses at 2.5 Hz at baseline and again 25 minutes after SC bethanechol (5mg) (= B-EPT bethanechol test).

Treatment consisted of SC bethanechol 5 mg, 4 times daily. After 10 days, therapy outcome was evaluated, and was defined successful if post void residual urine was below 20 ml for more than 90% of all free voidings measured during 3 days.

Results

Treatment was successful in 11 patients, whereas in 9, bladder emptying improved but post void residual urine was repeatedly above 150 ml (treatment unsuccessful). The baseline B-EPT was not significantly different between both groups (p=0.7), whereas the B-EPT following bethanechol was significantly lower in the successful group (p=0.01). Furthermore the decrease in B-EPT after bethanechol was significantly higher in patients successfully responding to treatment (p<0.01). Individual data on the B-EPT bethanechol test are given in the table 1.

Table 1

<i>Treatment unsuccessful</i>		<i>Treatment successful</i>	
Baseline B-EPT (mA)	% decrease in B-EPT after bethanechol	Baseline B-EPT (mA)	% decrease in B-EPT after bethanechol
10.0	6	10.0	20
10.2	9	10.2	11
10.7	0	10.3	32
14.3	14	10.3	42
14.7	14	11	38
18	22	11.5	18
43	9	11.6	19
61	0	12	54
71	14	14	29
		40	38
		61	54

The B-EPT bethanechol test was considered positive if (1) the baseline B-EPT was less than 20 mA and the decrease following bethanechol was more than 15% of the baseline value, or (2) the baseline B-EPT was higher than 20 mA and the decrease following bethanechol was more than 20 %. Table 2 compares the B-EPT test and the outcome of the treatment.

Table 2

B-EPT test	Treatment successful	Treatment unsuccessful
Positive	8 (89%)	1 (11%)
Negative	1 (9%)	10 (91%)

Interpretation of results

In patients with impaired detrusor contractility and urinary retention, attention has mainly focused on the motor function of the lower urinary tract. However, our results indicate that functional state of the afferent nervous system is also important as the bladder electrical perception threshold in patients who regain complete bladder emptying after treatment with SC bethanechol, is significantly lower immediately after bethanechol and decreases to a value within the normal range. The afferent nervous system in these patients may have some restoring power and by repetitively stimulating the sensory branch through bethanechol injections, both sensory and motor function of the lower urinary tract may recover. Although the study population is limited, criteria based on the immediate effect of bethanechol on the bladder electrical perception threshold can help to predict treatment outcome. By this simple and short test, patients with impaired contractility who can successfully be treated by drugs can be selected, and therefore can be omitted from further more invasive treatments.

Concluding message

These preliminary results show that sensory evaluation of the lower urinary tract by determining the electrical perception threshold can be used to predict treatment outcome in patients with impaired detrusor contractility with urinary retention. A larger patient population will permit a further definition of the test criteria and evaluation of the sensitivity and specificity of the B-EPT bethanechol test. This test may increase the efficiency of bethanechol to treat patient with urinary retention by adequately selecting patients likely to respond to bethanechol.

References

- (1) Am J Physiol 262: R478, 1992
- (2) J Urol 165:802, 2001.