395

Sugimoto Y[1], Honjo H[1], Hino K[1], Okada K[1], Nakao M[1], Kitakoji H[1]
1. Meiji University of Oriental Medicine

IMPACT OF ACUPUNCTURE STIMULATION TO SACRAL REGION ON BLADDER FUNCTION IN CONSCIOUS RATS

Hypothesis / aims of study

Acupuncture to sacral region could be useful clinically for the treatment of overactive bladder or detrusor overactivity (1, 2). However, the mechanisms of acupuncture effect for overactive bladder remain unknown in detail. The bladder contraction is inhibited by acupuncture stimulation of perineum in anesthetized rats (3). However, the influence of acupuncture stimulation on bladder function should be discussed under unanesthesia for evaluations of urinary sensory afferents. We investigated the impact of acupuncture stimulation on bladder function in conscious rats.

Study design, materials and methods

A total of 42 male Sprague-Dawley rats weighting 210 to 260gm were used in this study. Under pentobarbital anesthesia (50mg/kg, ip), a polyethylene catheter was inserted into the bladder dome for cystometric measurements. Four or five days after the operation, the following cystometric parameters were measured without anesthesia as intercontraction interval (ICI), maximum voiding pressure (MVP) and threshold pressure (TP). Saline was infused into the bladder continuously at the rate of 0.2ml/min using infusion pump through the experimental period. Of 24 rats were divided into 4 groups by 6 rats in each group as follows; acupuncture, atropine, prazosin and α,β-methylenATP. The three constant micturition contractions were obtained and determined as baseline. One group of rats was performed acupuncture to sacral region for 1min following baseline. To investigate the effects of drugs compared with acupuncture, the other groups of rats were administered intravenously prazosin (2mg/kg), α,β-methylenATP (1mg/kg) or atropine (0.5mg/kg) following baseline. The three micturition contractions after acupuncture and administration of the drugs were evaluated as the effects. Remaining of 18 rats were divided into 3 groups by 6 rats each due to analysis the effects of acupuncture after intravenous injection of the drug, atropine, prazosin or α,β-methylenATP, following baseline. Acupuncture was performed after three micturition cycles following the drug administration. The three micturition contractions after administrations of the drugs were compared with baseline and after acupuncture following drug administrations. The Mann-Whitney U test and Bonferroni/Dunn multiple comparison were used for statistical data analysis. For all statistical analysis, $p<0.05$ was considered to be statistically significant.

Results

Figure 1 shows the cystometrogram of before and after acupuncture in a conscious rat. In acupuncture treated rats, there were significant decreases compared with baseline on TP ($p=0.0006$), however, there were no significant changes on both MVP and ICI. On the other hand, MVP was significantly decreased in both atropine treated group ($p=0.0003$) and prazosin treated group ($p=0.0002$), TP was significantly decreased compared with baseline in both α,β –methylen ATP treated group ($p=0.0005$) and prazosin treated group ($p=0.0005$). There were no significant differences on TP among the following three groups: α,β –methylenATP, prazosin and acupuncture. No significant changes were found on the other cystometric parameters in drug administration group. Table 1 shows the changes of cystometric parameters after acupuncture following the drug administrations. There was a significant decrease on TP after acupuncture following atropine injection ($p=0.015$), while there were no significant changes on TP after acupuncture following α,β –methylen ATP or prazosin injection.

Interpretation of results

These findings indicate that acupuncture to sacral region can inhibit the storage function on the mechanisms of atropine resistance inhibitory activity influenced by purinergic as well as alpha-adrenergic systems in filling bladder. It is suspected that acupuncture to sacral region could be useful clinically for refractory overactive bladder treated anti-cholinergic agents.

Concluding message

Acupuncture to sacral region might contribute to the inhibitory effects on storage function related with purinergic and adrenergic systems in conscious rats.

References

1) Urol Int 65: 190-195, 2000.
2) ICS2005 Abstract No.541
3) Neurosci Res, 15:189-198, 1992.

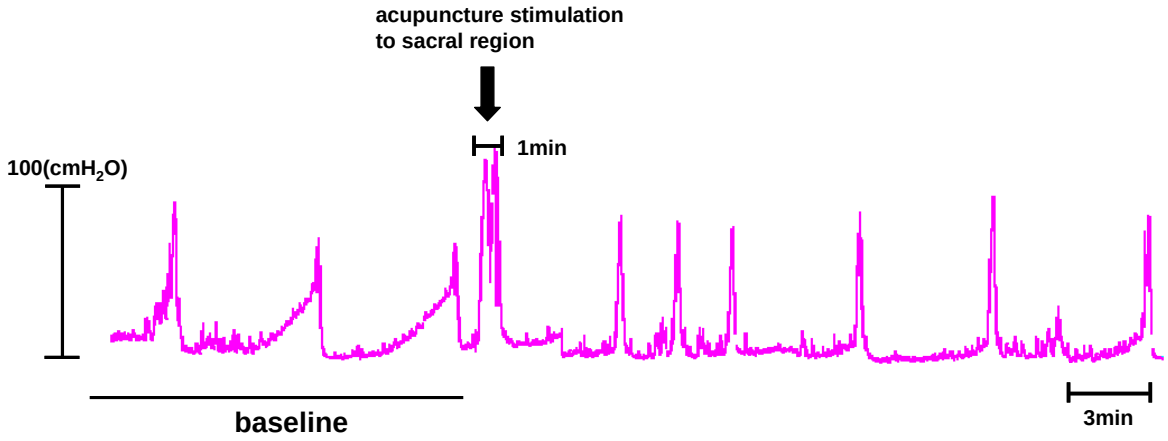

Figure 1 Description of a cystometrogram before and after sacral acupuncture in a conscious rat

Table 1 Effects of drug administrations and sacral acupuncture on cystometric parameters

(mean ± SE)

	Atropine 0.5mg/kg.iv +ACP (n=6)			Prazosin 2mg/kg.iv+ACP (n=6)			α β -MeATP 1mg/kg.iv+ACP (n=6)		
	baseline	iv	ACP	baseline	iv	ACP	baseline	iv	ACP
ICI (sec)	151.7 ± 25.5	160.6 ± 11.1	147.2 ± 18.3	195.1 ± 30.8	152.6 ± 17.5	148.1 ± 25.4	198.8 ± 11.0	230.5 ± 13.4	227.6 ± 13.1
MVP (cmH_2O)	72.8 ± 4.0	50.3 ± 2.9 *	46.1 ± 2.1	51.6 ± 2.7	33.2 ± 1.4 *	25.6 ± 1.4	62.3 ± 3.0	57.9 ± 2.9	56.8 ± 2.7
TP (cmH_2O)	31.2 ± 2.5	24.5 ± 2.4	16.6 ± 1.5 †	20.3 ± 2.3	9.9 ± 1.0 *	5.6 ± 0.7	24.7 ± 4.9	14.9 ± 2.6 *	10.9 ± 2.4

ACP, acupuncture ; iv, intravenous ; ICI, Intercontraction interval ; MVP, Maximum voiding pressure; TP, threshold Pressure
＊: baseline vs after injection ($p<0.05$) , †: after drugs administration vs after acupuncture following drugs administration ($p<0.05$)

FUNDING: None

ANIMAL SUBJECTS: This study followed the guidelines for care and use of laboratory animals and was approved by Local Ethics Committee of Meiji University of Oriental Medicine