

EFFECTS OF SACRAL ACUPUNCTURE IN A RAT CYSTITIS MODEL INDUCED BY INTRAVESICAL HYDROCHLORIC ACID

Hypothesis / aims of study

Acupuncture is one of the neuromodulatory therapies. We have reported the effects of sacral acupuncture on overactive bladder, painful bladder syndrome and chronic pelvic pain syndrome (1). In our previous study using conscious rats with bladder irritation induced by acetic acid, sacral acupuncture may contribute to the improvement of the inhibition of capsaicin-sensitive C-fiber activation on bladder hypersensitivity (2). However, the effects of sacral acupuncture for painful bladder syndrome due to bladder inflammation remain unclear. The aim of this study is to investigate the possible mechanisms by which the sacral acupuncture improves the symptoms of painful bladder syndrome using rats with bladder inflammation induced by hydrochloric acid (HCl).

Study design, materials and methods

A total of 40 female Sprague-Dawley rats weighing 230-260 g were used. Chronic cystitis was induced by intravesical instillation of 0.2 ml of 0.4 N HCl in 30 rats. Then, the animals were divided into four groups: 1) 10 rats with chronic cystitis without sacral acupuncture stimulation and treated with oral administration of suplatast tosilate (IPD-1151T, 100 mg/kg) for 7 days (control group), 2) 10 rats treated with sacral acupuncture stimulation for 7 days (acupuncture stimulation group), 3) 10 rats treated with both sacral acupuncture stimulation and oral administration of IPD-1151T (100 mg/kg) for 7 days (combination group), and 4) 10 rats treated with instillation of 0.2 ml saline (sham group). After 15 days induction of cystitis, cystometry was performed under urethane anaesthesia (1.0mg/kg) following infusion of saline into the bladder at constant rate (6ml/hr) using infusion pump. As for cystometric parameter, inter-contraction interval (ICI) was evaluated in each group. The bladder was also assessed histopathologically after 15 days following instillation.

Results

In control group, the ICI significantly decreased as compared with sham group after 8 days ($P<0.001$) and 15 days ($P<0.001$). In acupuncture stimulation group of, ICI was significantly decreased as compared with sham group after 8 days. After 15 days, there was a statistically significant difference in ICI between the acupuncture stimulation and control group ($P<0.05$). In combination group, the ICI significantly increased compared with control group both after 8 days ($P<0.05$) and 15 days ($P<0.01$). (Figure 1) Figure 2 was photomicrographs showing the effects of sacral acupuncture on bladder histology (H-E staining) in rats with HCl-induced cystitis and infused intravesical saline in place of the HCl. A rat treated with intravesical HCl showed thinness of the urothelium and inflammatory cells infiltration and edema in the lamina propria (A), in contrast, a rat treated with intravesical HCl followed by sacral acupuncture showed thickening of the urothelium and inflammatory cells infiltration in the lamina propria (B). A rat treated with saline instillation showed as sham (C).

Interpretation of results

The results of this study suggest that sacral acupuncture was effective to improve bladder inflammation induced by HCl. IPD-1151T improved HCl-induced urinary frequency by anti-inflammatory action (3). The ICI in acupuncture stimulation group did not change after 8 days, but did in IPD-1151T treated rats. However, the ICI significantly extended in acupuncture stimulation group after 15 days compared with control group. The cystitis model rat induced by HCl is different from acetic acid induced bladder inflammation model. However, sacral acupuncture stimulation extended the interval in rats with cystitis induced by HCl, in a similar way by which sacral acupuncture improves the bladder irritation induced by acetic acid. These results suggest that the effects of sacral acupuncture on bladder inhibition might act on nociceptive afferents, which are thought to cause abnormal bladder sensation because of HCl-induced inflammation of the urothelium.

Concluding message

Sacral acupuncture prolonged the inter-contraction interval in the inflammation model rats induced by HCl. There is a possible mechanism on bladder inhibition acting on nociceptive afferents due to bladder inflammation.

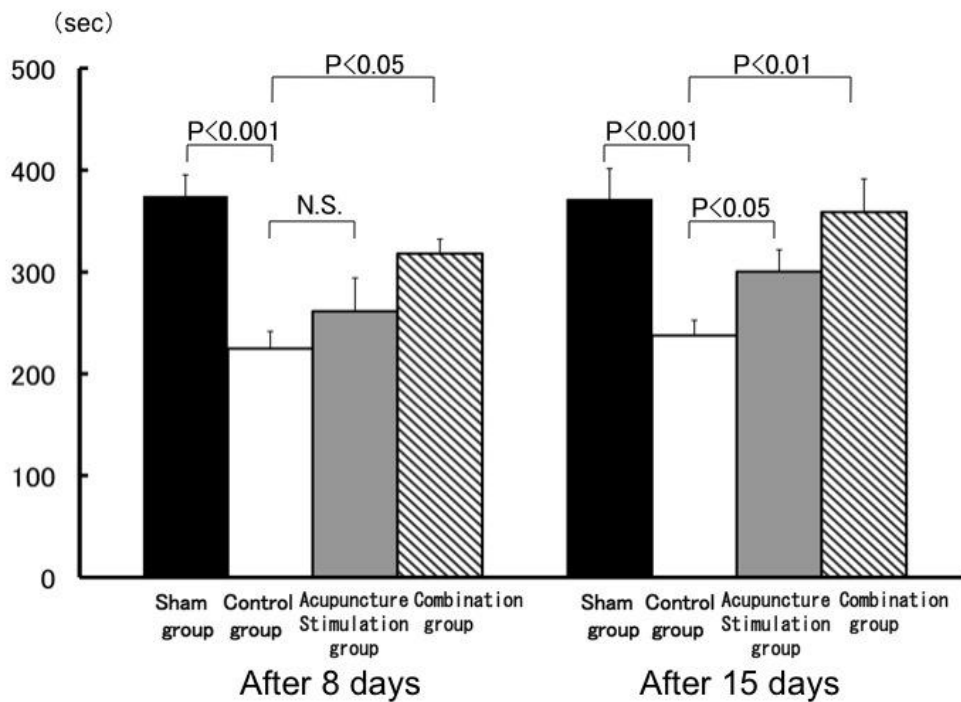


Figure 1 Changes in ICI among the 4 groups

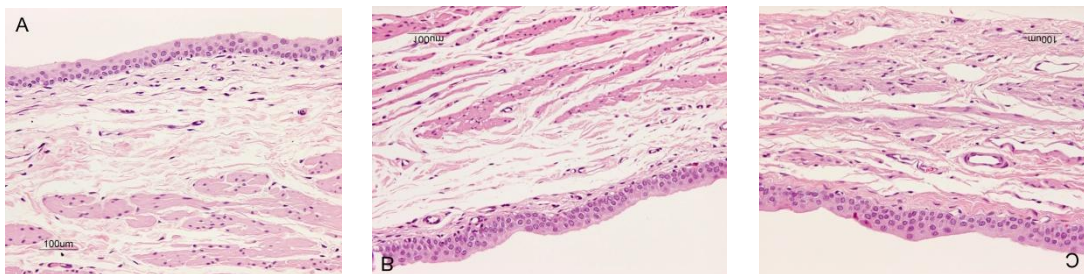


Figure 2 Photomicrographs showing the effects of sacral acupuncture

References

1. Int J Urol 11: 607, 2004.
2. Urology 75:730, 2010.
3. BJU Int100:935, 2007.

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Is this a clinical trial?	No
What were the subjects in the study?	ANIMAL
Were guidelines for care and use of laboratory animals followed or ethical committee approval obtained?	Yes
Name of ethics committee	Ethical Committee of Meiji University of Integrative Medicine