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THE EFFECT OF COMMENCING TIME OF DIURETIC LOAD ON THE CONTRACTILE FUNCTION OF RAT URINARY BLADDER

Aims of Study

We previously reported that diuresis since before bladder outlet obstruction (BOO) has resulted in an increase in bladder mass and wall thickness resulting in an increase in contractile strength. This augmented contractile strength of bladder smooth muscle resulted in protection against the contractile dysfunction secondary to BOO. However, it has been still unclear that the effect of commencing time of diuretic load on the bladder smooth muscle function. The aim of this study is to determine the effect of commencing time of diuretic load on the contractile ability of rat bladder smooth muscle with BOO.

Methods

Male Sprague-Dawley rats were separated into 6 groups of 6 rats each; group 1: control, group 2: no BOO with diuresis, group 3: BOO without diuresis, group 4: BOO with diuresis, group5: BOO with diuresis commencing 10days after BOO, group6: BOO with diuresis only before BOO. All groups were fed normal water before BOO except for group 6. According to our previous study, diuresis was induced by feeding 5% sucrose instead of water. After 3 weeks of obstruction, bladders were rapidly excised, and then longitudinal muscle strips of bladder were obtained, and mounted in isometric organ baths for physiological studies (the responses to carbachol, KCl and electrical field stimulation).

Results

Sucrose-induced diuresis resulted in a significant augmentation in bladder mass (weight) and a mild increase in smooth muscle contractility of rat bladder as compared to water-feeding group. Although partial outlet obstruction caused an increase in bladder mass and a decrease in smooth muscle contractility in all groups, these alterations in bladder wall property in sucrose feeding groups (group 4, 5) were significantly much less than in water feeding groups(group 3,6). In partial BOO rats, while feeding water (group 3) showed a remarkable attenuation in bladder smooth muscle contractility in response to all stimuli, sucrose feeding immediately commencing after BOO (group4) revealed no discernable decrease as compared to control. However, sucrose feeding commencing 10 days after BOO (group 5) demonstrated a significant decrease in bladder smooth muscle contractility. On the other hand, sucrose feeding only before BOO (group6) revealed a marked attenuation in smooth muscle contractility as compared to control, and the contractile ability of bladder smooth muscle in response to all stimuli was the weakest in all groups except for group 3.

Conclusions

Early diuresis induced even from after partial BOO showed an increase in contractile strength resulting in increase in bladder mass, and tended to protect against the contractile dysfunction secondary to BOO. However, the benefit of late diuresis was less than in early. In all groups, diuresis only before BOO had no advantage over the protection against the smooth muscle contractile ability following BOO. These results suggested that diuresis has more beneficial effect on the protection against the smooth muscle contractility secondary BOO as it is earlier.