542

Igarashi T[1], Takimoto Y[1], Sato K[1], Sugimoto S[1], Kodama M[1], Ono M[1], Hirakata H[1], Kawata N[1], Yoshida T[1]
1. Nihon university

EVALUATION OF BLADDER FUNCTION IN THE AWAKE RAT ASSOCIATED WITH STREPTOZOTOCIN-INDUCED DIABETES

Aims of Study

We have investigated and reported the increased level of bladder nerve growth factor (NGF) at one week associated with diabetes in the rat induced by streptozotocin (STZ).
This time we investigated the bladder function more minutely in STZ induced diabetic rat at one week and at four week through urodynamic studies in awake status.

Methods

(1) *Materials* One hundreds subjects of 7 to 11 week old female Wister rats were used. They were divided into 40 subjects of the diabetic (twenty were used one week after STZ injected another were used four weeks after STZ injected) , 20 of the polyuric and 40 of the control group (age-matched DM1w and DM4w). In the diabetic group, rats were injected STZ (60mg/kg) diluted with 0.1 M citrate buffer for one time from caudal vein after fasting for 24 hours.
With a blood sugar level over 250 mg/dl, we defined the rat to have diabetes. In the polyuric group, rats were given 5% sucrose in water instead of plain water. In the control group, rats were injected the same volume of citrate buffer.
(2) *Placement of a cystostomy and measurement of intravesical pressure*
Under anesthesia with pentobarbital sodium (30mg/kg), a cystostomy was placed for each group of rats. The abdomen was opened (lower midline Incision), and a saline filled polythene catheter was inserted into the bladder. It was tunneled subcutaneously to the back of the animal and the abdominal incision was closed. The polythene catheter connected to pressure transducer and infusion pomp, and then we could observe intravesical pressure. A complete cystometrogram was obtained by inflating saline with a rate of 1.2 ml/h. Cystometry was performed at 3 hour. after placement of a cystostomy.
(3) *Evaluated parameters*
At one week and four week after injection, we measured the body weight and blood sugar of each rat, as well as micturition volume, intravesical baseline pressure , intravesical threshold pressure and maximum voiding pressure.
(4) *Statistical analysis* Obtained parameters were evaluated by the Mann-Whitney U test for the difference between each of group. The significance was determined with a p value of less than 0.05.

Results

At one week STZ-Induced diabetic rats showed statistically significant increase in mean micturition volume (0.20±0.014ml.,$p<0.0001$) and maximum voiding pressure(17.9±0.79 cm.H2O.,$p=0.0002$) compared to the mean micturition volume(0.07±0.004ml.) and maximum voiding pressure (13.3±0.70 cm.H2O) for controls. No differences in intravesical baseline pressure and intravesical threshold pressure were seen in STZ-Induced diabetic rat compared to control rats. At four week STZ-Induced diabetic rats showed statistically significant increase in mean micturition volume (0.42±0.112ml.,$p=0.0005$) and decrease maximum voiding pressure (12.7±0.657 cm.H2O.,$p=0.0005$) compared to the mean micturition volume(0.22±0.061ml.) and maximum voiding pressure (16.9±0.112 cm.H2O) for controls.
When compared with polyuric group, diabetic group at four week showed the same micturition volume(0.27±0.016ml. vs. 0.42±0.112ml.,$p=0.97$). However, the maximum voiding pressure significantly decreased in diabetic group compared to polyuric group (12.7±0.657 cm.H2O. vs. 15.5±0.657 cm.H2O.,$p=0.009$).

Conclusions

When compared to the control, the bladder function of the STZ induced diabetic rats at one week became hyperactive. However, the rats at four week had a hypoactive bladder with increased micturition volume. We assessed that the increase of micturition volume was depend on increased total urine volume, where as the change in the maximum voiding pressure presumably derived from organic change of bladder associated with diabetes.