

## CLINICAL OUTCOMES OF EARLY INTERVENTION BASED ON URODYNAMIC RISK FACTORS FOR INFANTS WITH SPINA BIFIDA

### Hypothesis / aims of study

Spina bifida is often associated with lower urinary tract dysfunction (LUTD), such as insufficient voiding, low compliance bladder, and detrusor-sphincter dyssynergia (DSD). Optimal treatments are often needed for these patients to prevent renal dysfunction or urinary tract infections. However, it is still controversial whether early prophylactic intervention with clean intermittent catheterization (CIC) and anticholinergic medication based on detection of urodynamic risk factors [1, 2], or delayed intervention with intensive clinical follow-up [3] is better for the management of LUTD. Therefore, we retrospectively reviewed clinical outcomes of the spina bifida infants managed with early and periodic urodynamic evaluation and prophylactic treatment.

### Study design, materials and methods

The medical records of twenty-four infants (19 myelomeningocele, 5 spinal lipoma), who had undergone the initial video-urodynamic study (V-UDS) to evaluate LUT function at their ages under 1 year old, and were followed-up periodically in our out-patient clinic, were reviewed. The V-UDS was carried out without any anaesthesia or sedatives. The infants who showed low compliance bladder (<10ml/cmH<sub>2</sub>O), high detrusor leak point pressure (>40 cmH<sub>2</sub>O), or existence of DSD were diagnosed as the high risk group and the others classified as the low risk group. In all infants classified as the high risk group CIC was introduced immediately after the diagnosis with or without antimuscarinic agents and the low risk group of infants were just followed by watchful waiting. Both groups of children were periodically checked up with history taking, urinary analysis and ultrasound of the Kidneys and urinary tract every 3-4 months. Follow-up V-UDSs were also repeated every 6-12 months. When vesico-ureteral reflux (VUR) was detected, DMSA renal scintigraphy was repeated yearly to detect renal scar formation in those children. One-way ANOVA was applied for the comparisons of mean values of the bladder compliance before and after treatment, and p<0.05 is taken as statistically significant.

### Results

Mean age at the first V-UDS was  $3.1 \pm 0.5$  months (median 2.5 months). Mean follow-up period was  $57.8 \pm 5.5$  months (median 55.5 months). At the first V-UDS, 10 infants were classified as the high risk group, and CIC was immediately introduced in all of these urodynamically high-risk infants, and nine out of the 10 patients were also treated with antimuscarinic drugs during follow-up. Bladder compliance in the high risk group significantly increased during follow-up (Fig. 1). VUR was detected in 9 (37.5%) infants (12 ureteral units) in the high risk group at the first V-UDS, but during follow-up, the VUR was disappeared in 4 (33.3%) ureteral units, and down-graded in 4 (33.3%) ureteral units, and the remainings (4 ureteral units) were stable. On the other hand, VUR was found in 3 ureteral units in 3 infants of the 14 infants classified as the low risk group at the first V-UDS. Among these 14 low-risk infants at the first V-UDS, 7 children shifted to the high risk group during follow-up (mean  $2.6 \pm 0.8$  years) and CIC with antimuscarinic medication was applied to these children. Bladder compliance in this group increased after introduction of the treatment from  $4.6 \pm 0.9$  to  $11.3 \pm 2.6$  ml/cmH<sub>2</sub>O. VURs were detected in 3 ureteral units (in 3 children) of this group just before the treatment, but they disappeared or downgraded after the treatment. The other 7 children remained in the low risk group during the whole period of follow-up and they were just followed up periodically without any treatment. Nobody had VUR in this low-risk group. No one showed any deterioration of the upper urinary tract during follow-up by ultrasound or DMSA. Neither anybody needed surgical intervention during follow-up.

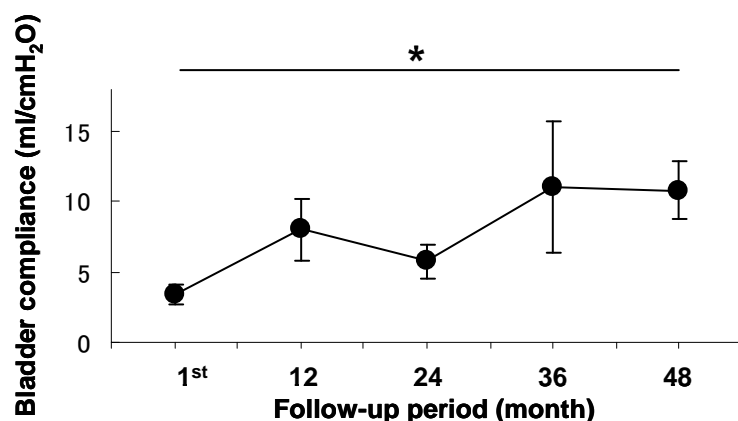


Fig. 1 Changes in bladder compliance in infants with urodynamically high-risk factors at the first V-UDS and thereafter managed with early intervention during follow-up

\* indicates p < 0.05 by one-way ANOVA

### Interpretation of results

The results of the present study suggest that early intervention with CIC and antimuscarinic medication based on the existence of urodynamic risk factors from newborn can contribute to improve bladder compliance and VUR, and to preserve the upper urinary tract function. During follow-up, we found that half of the infants who had had no

urodynamic risk factors at the first V-UDS carried out at the age under 1 year developed deterioration of LUTD with emerge of the high risk factors at the follow-up V-UDS. Again, prompt introduction of CIC and antimuscarinic medication based on the follow-up V-UDS findings also in this group showed improvement of bladder compliance and VUR, and no upper tract deterioration. This suggests that periodic closed follow-up is necessary for management of LUTD in these children.

#### Concluding message

Early detection of high risk factors for upper urinary tract deterioration by intensive evaluations including V-UDS from neonate and periodic closed follow-up and prophylactic prompt-timing management of LUTD with CIC and antimuscarinics based on the urodynamic risk factors in children with spina bifida can improve bladder compliance and VUR, and possibly contribute to prevent the renal dysfunction induced by VUR or urinary tract infection. However, further studies with longer follow-up periods and a prospective randomized trial, are needed to clarify this point.

#### References

1. Amer J Dis Child, 146:840,1992
2. J. Urol, 56,2031, 1996
3. J.Urol, 152, 807,1994

**FUNDING:** none

**HUMAN SUBJECTS:** This study did not need ethical approval because Because this study is retrospective review of the medical records obtained in our ordinary outpatient clinic. but followed the Declaration of Helsinki Informed consent was obtained from the patients.